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# 73<sup>®</sup> Amateur Radio Today

## Build:

- 1.2 GHz FM Rptr
- AC Voltmeter
- Simple Keyer

## Review:

- Ham  
Weather  
Station

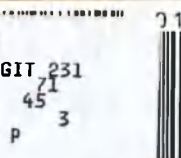
## Unveiled:

- VTVMs
- IRCs

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COVER: Photo by Joe Moell  
KØOV. See page 47.

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*A weather station with hams in mind.*

## QRX . . .

### Terrorism — What Is That?

I got a big laugh out of the dialogue of Osama bin Laden, the Taliban, politicians, and the news media. They say terrorists will hit us again in the oncoming weeks and months. What a joke! You have a better chance of getting killed on Interstate 35E than by a terrorist.

Osama has probably seen 100-degree-plus summers in Afghanistan, but he doesn't have fire ants to go with it. If he did he wouldn't be sleeping on the ground in his cave. He talks of pain and suffering he

is going to inflict on us. He doesn't know what pain is until he gets kicked by a green-broke, two-year-old colt in a freezing rain.

Germ warfare? Texas ticks will give you Rocky Mountain Spotted Fever and Lyme disease, blister beetles kill your horse, greenbugs destroy a wheat crop, and termites eat your house. Anthrax has killed Texas cattle for over 125 years. What's new?

Our prairie dogs carry the plague, armadillos carry leprosy, and our bats and skunks carry rabies.

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## Wise Up & Beat the Odds

### NEVER SAY DIE

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#### If You Think ...

... That Saddam is through getting even with us, you've been watching too many football games and not enough *Frontline* reports on PBS. It's just too easy for the who-knows-how-many Iraqi "students" and "visitors" to set up cells to make biological weapons. As with the September attack, we've seen that our government has been hopelessly inept in dealing with this mess.

Immigration has no idea how many Iraqis, Iranis, Saudis, Jordanians, Syrians, Sudanese, and so on are here, or where they are. The FBI has continued its long history of not communicating with other agencies, ditto the CIA, and so on.

But, no matter how the terrorist networks hit us, the one thing that we're going to really need is communications. And that's another thing that our beloved government hasn't made any effort to provide. Every time there's an emergency, the phones and power go out, taking the cell phone system with it. Our police, fire, rescue, and other services have no way to inter-communicate — until we hams step in.

So what's our national organization doing about beefing up and coordinating us so we'll be better prepared? In the past it's been up to the hams in the emergency area to solve the problem after a disaster has hit. Now we need a national disaster communications system and we don't even have the beginnings of one.

If we're going to be able to provide services anywhere anytime, we need all 600,000 licensed hams to be ready to help, not just the approximately 100,000 now active. Plus, we need a new wave of youngsters coming into the hobby.

Please tell me if you've seen any sign that the ARRL HQ gang has come in off the Newington golf course yet and are getting hot to promote amateur radio nationwide. Any sign at all.

#### What to Do?

That's easy. Amateur radio needs national visibility. The American public needs to find out that there still is an amateur radio service. We need exposure.

So, how can the League get us exposure without spending a fortune on space advertising in magazines and newspapers? Two easy ways. One is to send out press releases every time we provide a service, or even prepare to provide a service. Hundreds of ham clubs have emergency vans set up. Please tell me if you've seen any articles about them in the media. I've seen one newspaper clipping in the last three years. If they don't know how to do this, I have a \$40 video giving away the secrets I've learned.

The other way is to use talk radio.

There are thousands of talk radio shows, and all of them are looking desperately for interesting people to interview. In early November, I got a call from Alan Corbeth

N7PUN asking if I'd be available that night to go on with Barbara Simpson on Art Bell's (W6OBB) *Coast-to-Coast* talk show. You bet. I talked for four hours and the result was a two-week avalanche of E-mails, letters, faxes, and back-to-back phone calls.

Yes, of course I talked about amateur radio.

Please see if you can find out why the League hasn't fielded some hams with the gift of gab to promote our hobby on talk radio. A list of 700 talk shows is inexpensively available. It gives the details on the station, host, producer, phone and fax numbers, and so on.

I've been getting on as many talk shows as I can, but I'm just one person — and I'm busy helping a new magazine get started to boost vacationing in New Hampshire.

#### Walking the Walk

It's been a while since amateur radio has contributed significantly to the radio state of the art. The last major contribution was, I'd say, our development of repeater systems. It was our development work which made cell phones possible. We can claim that as a success story, and never mind the downside of millions of people slowly destroying their brain cells and getting brain tumors from having the antennas too close to their heads. Like the cigarette deaths, this will, I expect, turn into another lawyers' paradise.

But that was a generation

ago, and politicians with a valuable natural resource to milk have very short memories.

Yes, it's much more difficult to experiment in these days of massive integrated circuits and no good source of parts. It isn't like the old days when some radio stores had dozens of tables of parts. Cheap parts. I used to have boxes of potentiometers, cartons of variable capacitors, thousands of resistors, boxes of capacitors of every kind, tube sockets, shelves of tubes, switches, relays, transformers, wire, cables, and connectors. Well, whenever I needed a part I didn't have I'd buy a dozen or two, so I'd have 'em.

With spread spectrum and digital communications, we have fallen behind. Way behind. The ARRL's single-minded preservation of CW, which is only a slightly faster way of communicating than smoke signals, has helped keep amateurs focused on the past instead of charging off into the future.

I still remember how hard the ARRL fought RTTY, and that was 50 years ago. They pulled every dirty trick they could to prevent RTTY from escaping 2m and getting onto the low bands. Why? Heck, here was a new mode of communications which was five times as fast as CW and error-free. It presented a serious threat to their National Traffic System, which had its origins back in the old spark days when messages had to be relayed to go any distance.

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*continued from page 1*

We have rattlesnakes, copperheads, and water moccasins. Ho-hum.

They talk of gas and biological warfare. They have never pulled in behind a cattle truck while it's raining, or ridden in the front seat of a pickup between two cowboys after they've just eaten a big bowl of Texas Red. Texas ain't for sissies! We have posted signs all over the state that say "Don't mess with Texas!"

Osama and the rest of you (soon to be Texas deep-fried) turkeys, consider yourself warned!  
*From the Internet.*

## Pay to Listen to Old Art Bell Radio Shows

If you are a fan of Art Bell W6OBB's *Coast-to-Coast* AM radio program and you miss tuning in one night, it's going to cost you money to hear a repeat of the show on the World Wide Web. This, after Premiere Radio Networks announced that as of Monday, October 15, 2001, there would be a fee to access old shows.

According to the Premiere announcement, the longtime free audio streaming has disappeared and has been replaced with a new \$6.95-a-month subscription service called Art Bell's StreamLink. With StreamLink you can listen anytime you like to any Art Bell show from the last 30 days.

Not everyone is happy with the decision to charge, including Bell. According to a posting to his Web site, it was not his decision to change the free Internet access. Rather, it was a decision made by Premiere based on cost.

Bell says that there are now millions of people on the Internet, and bandwidth costs money — about \$1.5 million per year for all the Premiere shows. He says that Premiere hopes to break even. W6OBB says that he has been receiving many angry E-mails and that he understands the anger at having to pay for what was free. But he also understands that the company cannot continue to cover the ever growing cost.

Bell adds that there is at least one bright spot. Says W6OBB: "It is still free on the radio."

More information is on the Web at [www.artbell.com].

*Thanks to the Art Bell Web site, via Newslite, Bill Pasternak WA6ITF, editor.*

## FCC Creates New Disaster Communications System

You may want to write your congressman on this one.

"This, in essence, is designed to remove third party relays — Amateur Radio operators" per Scott Verity KC2FBV in his letter to the editor of *World Radio*, October 2001. Scott goes on to

quote Part 97 Subpart A — General Provisions #97.1 (Basis and purpose), the FIRST item listed: "(a) Recognition and enhancement of the value of amateur service to the public as a voluntary noncommercial communications service, particularly with respect to providing emergency communications."

"To that end, RACES is provided for by FCC regulations (#97.407)," per Scott, and he goes on to say "The FCC, by creating and implementing this new 32-channel interservice communications system, will ELIMINATE Amateur Radio Service's PRIMARY reason for existence."

Scott discusses hobby versus service and comes to the answer: "A SERVICE is publicly viewed as VITAL and a hobby, in the public's eye, is seen JUST as a hobby. A hobby, in the public's eye, is done SOLELY for fun and is of no enduring value to society. Amateur radio is ... a service, that, to our advantage has a hobby side."

This new 32-channel system will be spending our tax dollars on operators, equipment, repair, maintenance, training, and perhaps facilities lease payments. The goal is year 2006, which should give the FCC to reallocate UHF TV channels 60 through 69 from broadcasters.

Mr. Verity suggests that the U.S. government openly endorse amateur radio, thus avoiding the outlay of tax money for training, equipment, personnel, facilities, etc. *We suggest that these channels be allocated to the amateur radio community specifically for such emergency communications.* (It is suspected that there would be video signals included in the new proposal.) There would be no waiting till the year 2006; radio amateurs are here now.

Scott encourages all citizens to get involved for no increase in taxes for these services. "I urge EVERY amateur — ESPECIALLY those involved in public service (NTS, ARES, RACES) — to write a letter urging your public officials to REJECT the new FCC decision and to affirm their support of amateur radio."

Which public officials would I suggest sending letters to?

Whether by mail or E-mail:

Senators

Representatives

Governor

FCC (FCC Chairman Michael K. Powell)

President George W. Bush

Vice President Dick Cheney

Take a moment to write each of the above. Ask them to REJECT the proposed 32-channel inter-service communication system and to fully support amateur radio instead."

(References: *World Radio*, October 2001, "Letters to the Editor," Scott Verity KC2FBV. *World Radio*, July 2001, "FM & Repeaters," Bill Pasternak WA6ITF.)

*Thanks to Tuned Circuit, November 2001, a bulletin of The L'Anse Creuse ARC, via Newslite, Bill Pasternak WA6ITF, editor.*

## DARA Opens Nominations for Ham of the Year

The Dayton Amateur Radio Association has opened the nominating period for the 2002 Dayton Hamvention Awards. There are three awards presented each year. They are the Radio Amateur of the Year, Special Achievement, and Technical Excellence.

The Radio Amateur of the Year is described as the special person who has made a long-term commitment to the advancement of amateur radio. We are looking for a well-rounded individual who has contributed to our hobby in some outstanding way.

The Technical Excellence award is for the person who has made an outstanding technical advancement in the field of amateur radio, while the Special Achievement Award is reserved for the ham who has made an outstanding contribution to the advancement of amateur radio. This latter award is usually given to a respected amateur who spearheaded a single significant project.

All amateurs Novice through Extra are eligible. Awards are decided by the Awards Committee, based partially upon the information received. Magazine articles, newsletters, newspaper clippings, videos, and the like are appreciated but cannot be returned. The deadline for nominations is January 31, 2002. Nominations can be submitted by U.S. Mail to Post Office Box 964, Dayton, OH 45401, or by completing the convenient e-form on the Web at [www.hamvention.org].

*Thanks to DARA, via Newslite, Bill Pasternak WA6ITF, editor.*

## FAR Scholarships

The Foundation for Amateur Radio, Inc., a nonprofit organization with headquarters in Washington DC, plans to administer 62 scholarships for the academic year 2002-2003 to assist licensed radio amateurs. The Foundation, composed of over 75 local area amateur radio clubs, fully funds seven of these scholarships with the income from grants and its annual hamfest. The remaining 55 are administered by the foundation without cost to the various donors.

Licensed radio amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college, or technical school. The awards range from \$500 to \$2,500, with preference given in some cases to residents of specified geographical areas or the pursuit of certain study programs. Clubs, especially those in Delaware, Florida, Maryland, Ohio, Pennsylvania, Texas, Virginia and Wisconsin, are encouraged to announce these opportunities at their



meetings, in their club newsletters, during training classes, on their nets and on their World Wide Web home pages.

Additional information and an application form may be requested by letter or QSL card, postmarked prior to April 30, 2002, sent to: FAR Scholarships, PO Box 831, Riverdale MD 20738.

The Foundation for Amateur Radio, incorporated in the District of Columbia, is an exempt organization under Section 501(C)(3) of the Internal Revenue Code of 1954. It is devoted exclusively to promoting the interests of amateur radio and those scientific, literary, and educational pursuits that advance the purposes of the Amateur Radio Service.

## Hell-o-o-o-o ...

Ham radio played a role in reuniting with his family a man who had been hiding in the jungles of Guatemala for over three decades. The *CQ Magazine* Web site reports that 72-year-old Salomon Vides of El Salvador emerged from the Guatemalan jungle recently after hiding there for 32 years from a war that lasted about 100 hours.

In 1969, El Salvador invaded Honduras and Vides, a migrant worker, ran into the jungle to escape retaliatory raids. The Organization of American States quickly brought the war to an end, but Vides says he never got the word. He was discovered in August by Rene Sonabo, a taxi driver and Guatemalan ham radio operator, and Sonabo's son. After persuading Vides that no one was trying to kill him, Sonabo used his amateur station to relay the news to Vides's stunned family in El Salvador. He has since been reunited with his brother, but the family had not been able to locate his wife and three children.

Thanks to CQ, via Newsline, Bill Pasternak WA6ITF, editor.

## Using Microwaves to Clean Exhausts

Radio waves could be the answer to solving one of the world's major environmental problems.

Industrial researchers from the Australia's Swinburne University of Technology in Melbourne have announced a new microwave system that can remove up to 90% of the carbon dioxide and carbon monoxide from automotive engine exhausts.

The microwave emissions converter is being touted as the most important breakthrough for reducing automotive exhaust gases since the development of the catalytic converter. The research team is now working on ways of transforming the carbon particles that are filtered and collected after ionization, and further processing them.

The researchers say that similar microwave deposition techniques are being used to transform carbon particles into artificial diamond powder, which could be used as a scratch- or wear-resistant coating on optical lenses, compact discs, and watches. It might also be used

for prolonging life of bioengineering materials, including prosthetic hip joints, orthopedic pins, and artificial heart valves and veins."

Thanks to Graham Kemp VK4BB and Q-News, via Newsline, Bill Pasternak WA6ITF, editor.

## Real Sky Hooks

The proposal for these sky hooks comes from ATG industries in southern England. It wants to build reflective airships and have them operate at a height of 65,000 feet.

These craft would be unmanned and use

solar-powered electric engines and a light-weight diesel engine. ATG claims that these "skyhook" ships could keep their position for up to 5 years, and that they could act as transponders for services such as mobile telephones, broadband Internet, and digital radio.

ATG estimates that 19 of these sky hook ships could cover most of the UK and replace as many as 4,000 mobile telephone poles and up to 10,000 towers that are expected to be needed for the new G-3 technology.

It's not known how long these sky hook ships

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# LETTERS

## From the Ham Shack

**Jim Beeson WA5QAP, Shreveport LA.** I have worked many modes in my 35 years of amateur radio. I have seen some good things happen in amateur radio and some not so good things happen. That is why I am writing this note with mixed emotions.

One of my more favorable experiences was working Low Earth Orbit (LEO) satellites in the '90s. They were fun to work and did not require much equipment or expense. The only drawback was that the contacts were relatively short — 15 to 20 minutes — and I am more of a ragchewer than that. I never worked Mode B on Oscar 13 even though I wished I had many times. That is why, when I first heard about AO-40, I was very excited.

I read article after article on AO-40 and was definitely caught up in the excitement of what was to be the best amateur radio satellite ever, a new era of satellite. Toward the end of the '90s, I decided to bite the bullet and go all out for AO-40. I spent over \$2,000 on new equipment. Some included two new antennas (144 and 450 MHz), AZ/EL rotator, new coaxial cable and rotator wire, preamps, downconverters, satellite tracking software, antenna control board, and on and on and on.

Then I waited. Launch delay after launch delay. Months went by, and I wondered if AO-40 would ever fly. Then the day came. The excitement was felt all over the amateur community. And a perfect launch, too. Now, after a brief time for the ground controllers to commission the bird, I could start using my shiny new equipment.

Well, it was not meant to be. AO-40 was met almost immediately with problems. Some were unavoidable, but others were not. Human error played a huge hand in what I saw was goof-up after goof-up. AO-40 kept losing ground, and I was wondering at one point whether there would be anything left to work at all! Everything on the AMSAT Web site and preliminary articles indicated that while some systems were malfunctioning, we were still in good

shape. Terms like "we hope nothing else fails" and "it is rocket science" were two of my favorites. My gosh, I thought the people who were running this bird WERE rocket scientists!

I had put my faith, not to mention a lot of my hard-earned money, into an organization that did not seem up to the challenge. And all I saw, when tough questions were asked, were emotional, defensive answers. I have been in the engineering industry for a long time now, and some of this group would not have survived with this kind of track record.

And that's not the latest. The same group, with plans to build another bird with much the same capabilities as AO-40, is asking for donations. Is something wrong with this picture?! It has been my experience that unless upper management is changed, then engineering is done much the same way, systems get put together much the same way, etc.

I think that before we start sending in our money and support, a clear picture of what is proposed needs to be addressed. Where are we going? What did we learn from our mistakes on AO-40? How can we avoid them on this new bird? The same types of things that any responsible organization addresses.

With AO-40 now limping along with only one functional transmitter, I am hoping and praying that it will last a while until some of these issues can be sorted out.

**Andy MacAllister W5ACM responds:** *Item A of the bylaws of AMSAT-NA directs the organization to develop and provide satellites, related equipment, and technology for amateur radio operators worldwide. AMSAT-NA achieves this end via many means, including internal projects and cooperative efforts with other organizations. Phase 3D (now AO-40) represents the most ambitious cooperative program to date. While it is true that three of the transmitters (V, U, and S1) appear to be inoperative, two others are currently in the operating schedule (S2 and K), while others are still being tested or waiting to be commissioned. The glass is not empty. In fact it is far better than half full!*

*Check out the status chart at [http://www.amsat-dl.org/journal/adlj-p3d.htm]. Yes, AMSAT-NA is soliciting support for new projects, this time to be directed and built here in North America. The organization*

*has learned a great deal from the experience of the Phase 3D program, but will continue to strive for cutting-edge endeavors. It is through ambitious undertakings that the imagination and drive for new horizons is cultivated in AMSAT volunteers, other partner groups, and educational institutions that wish to pursue their own efforts or join AMSAT-NA in theirs. Thanks for the input, Jim.*

**Arnold Samuels KH6COY, Ocean Shores WA.** I am announcing the death of my very good friend Richard Foster K7AJT on October 11, 2001, at the age of 77. Dick was born October 8, 1924, at Toledo OH. He married Catherine Garbe on June 30, 1951. She survives at the family home in Aberdeen WA.

Dick was blind for many years and became a self-employed piano tuner in 1956. He retired in 1980. He was a four-term president of the Grays Harbor ARC, and was also a member of the Northwest District Quarter Century Amateur Radio organization. He helped deliver Meals on Wheels in Aberdeen. Dick was a great fan of the Mariners. He helped many hams in his earlier years, and we will miss this very active and helpful man.

**George Vickery KB4OQU, Davidson NC.** I have an idea to help improve the sales of amateur radio equipment. Why don't the manufacturers lease radios just like car companies lease cars? I have leased autos and I have leased test equipment for a commercial radio repair business. What's in it for the average ham? Why, you can use a top-of-the-line radio with little of your cash in it. You don't worry about the maintenance, it's not yours. When the time is up for the lease, you can buy it at an already-agreed-to price. Maybe pick up a new one, or walk away, it's up to you.

This would give us a large number of good used radios in the marketplace. I think most people are more into operating than building. Maybe we would get more people on the air and support our bands. If you are willing to spend \$50 to \$70 for cable TV and \$21.95 for an Internet connection, then why not \$30 to \$40 a month for a new radio? It's a lot more fun than watching some dumb sitcom.

### Back Issues

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# Build a 1.2 GHz FM Repeater

*With a lot of initiative and perseverance, these hams realized success.*

*If you ever need to put an FM amateur repeater on the air, the 1972 ARRL book FM and Repeaters for the Radio Amateur has some clear advice: "Ideally, and in keeping with the true amateur spirit, the repeater operator or club technical committee would build the complete system from scratch."*

In the case of our 23cm (1.2 GHz) band, that is currently your only choice. The one factory-built repeater, the Icom IC-RP1220, has been discontinued for some time. This model, and an older one, the Icom RP1210, may show up occasionally secondhand. I was concerned about the older one, as it defaults to the obsolete 20 MHz split and operates in the wrong part of the band. When I brought home my quad-band Icom T81-AT handheld almost two years

ago, there were no voice repeaters for this band in my area, and only a few other hams nearby with equipment for it.

Reuben Reun WBØBWL lived eight miles away and had a 1.2 GHz mobile rig. We tried to set up a point-to-point link, but had poor results, even with a 16-element beam at my end. I called around to some of the microwave equipment suppliers like Down East Microwave and SSB Electronics. They did not at the time (1999) sell any amplifiers that could be used with an HT,

as you needed a microwave-rated transmit/receive switch for this application. One of the companies did suggest you could build a repeater using their transverters added to the inputs and outputs of a 2-meter repeater.

Our local VHF/UHF club, The Northern Lights Radio Society, runs a mini-hamfest every year called Aurora. There I found a kit-built 1.2 GHz transverter based on the Rick Campbell KK7B series of designs. The unit came in a cardboard box including 1.2 GHz 3-watt and 10-watt amplifier modules and a 900 MHz 3-watt amp all for a hundred bucks. The seller said the receive section was broken.

The transverters multiply a local oscillator (LO) signal, and use mixers and/or bandpass filters with an incoming or outgoing 1.2 GHz or 144 MHz signal to down- or upconvert. I found the calculator under some stuff on my workbench and learned to figure out my incoming and outgoing signals less the LO. A Radio Shack 1.2 GHz-rated frequency counter (on closeout for \$79) was going to be my test bench. I found out my LO was running, and attached my trusty 2-meter Icom u2AT (the other part of my test bench) to the input. I hooked up an HF dummy load

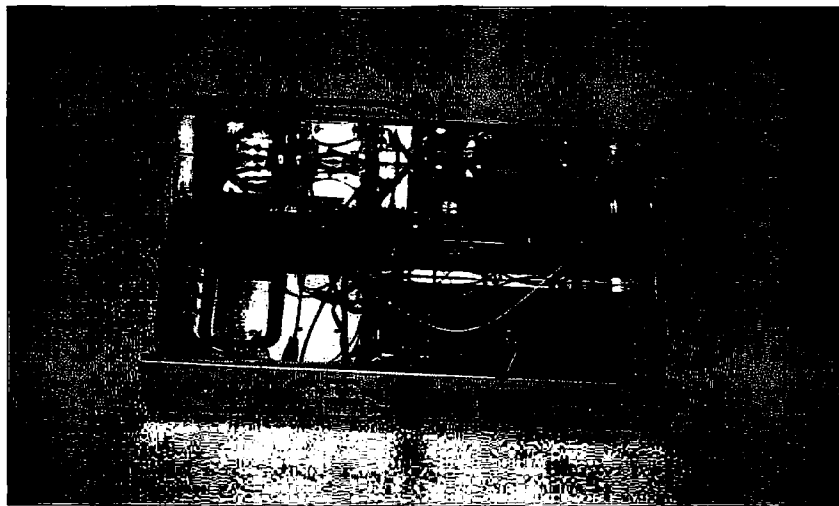


Photo A. Top view of the repeater.



and sat the T81AT nearby. I set the u2AT at 144, and the T81AT to receive at 1291 and pushed the PTT. Success! I was on the air on 1.2 GHz with the transverter.

I now had two problems — how to build a repeater with this setup, and how to get myself down to the proper repeater subband. Our local frequency coordinator, Paul Emeott KØLAV, took an interest in my project. I went over to his place, and he loaded the back of my pickup truck with all kinds of “microwave-type” stuff he had accumulated. This included parts from an old commercial microwave link system, and some TVRO satellite receivers. He also handed me a coordination packet and the ARRL-approved band plan — I needed to be at around 1285 MHz on my output, and -12 MHz down the input.

I called Down East Microwave, who agreed that I needed a new LO crystal to move the transverter frequency downward. The idea is to adjust the 2m output frequency (I’ll call that the IF from now on) to stay in the normal tuning range of 2m equipment. I did not want to be working with several watts of RF on the aircraft band, even between modules.

Now I need to build a 2m repeater. I thought about using one of my 1.2 GHz HTs as the receiver, and my transverter coupled to another 2m HT as the transmitter. I would also need a controller and IDer module to stay within the rules.


Hamtronics has a line of low-cost controllers and other parts. I selected their COR-4 controller kit. It was simple to build, and didn’t work. I replaced the CMOS chips one at a time with spares from my collection. One of the 4020B chips was no good. I was using an ungrounded soldering iron at the time, and may have zapped the chip accidentally. The controller sprang to life and beeped out my call over the speaker. Now I needed to interface my HT as a receiver. For that I would need to come up with carrier-operated squelch, which did not appear on the radio anywhere. The transmitter was easy — just add audio and PTT. There were many schematics for interfacing PTT to the HT in the packet radio literature.

My extensive QST and 73 files revealed a sample squelch board, and there was another one in the RSGB VHF Handbook. Neither one worked very well for my application, despite many hours of wiring and testing. I added the largest reed relay I could find in my parts stock to switch on the transmitter(s), as the built-in transistor in the controller was rated at only an amp or so. In trying to interface the HT to the PTT line, I got some 12V into the speaker mic jack and burned out the audio section on my u2AT.

At this point I called Hamtronics again. They had a nice synthesized 2m receiver with COR kit, the R301-2Y. Other than one slightly tricky surface mount IC on the bottom of the board, this one went together rapidly and worked the first time. The directions called for an RF signal generator for alignment of the many slug-tuned coils. Back to Reuben again — he got a Wavetec 3000 series RF signal generator on loan from Don Rice NØBVE, who also had a 1.2 GHz mobile rig.

I would need another transverter for receive. I ordered a receive-only model from Down East. The one I got at the hamfest was by this point driving me crazy — the LO was intermittent, and did not seem too happy with the new crystal. I kept noticing that some of the coils on my unit did not match the documentation for the board in the ARRL Microwave Projects book. I also got a \$99 1.2 GHz SWR bridge and wattmeter from Radio City, a Comet CM-120. Of the two amplifier kits I got, the 3-watt unit seemed OK, but the 10-watt model was baffling. I could not get more than 3 watts out of it. I studied the data sheets on the Mitsubishi modules used in the amplifiers, which are fairly simple devices to wire, but you have to be careful to ensure the resulting amplifier is stable. My Icom T81AT served as test signal generator for much of this project.

I ordered a Hamtronics factory-built 2m transmitter (T301-2T) as well. For only a little more than the kit you get a free crystal oven. Reuben kept telling me to be careful of frequency stability, since we were multiplying the crystal so many times. I also ordered a 20 dB



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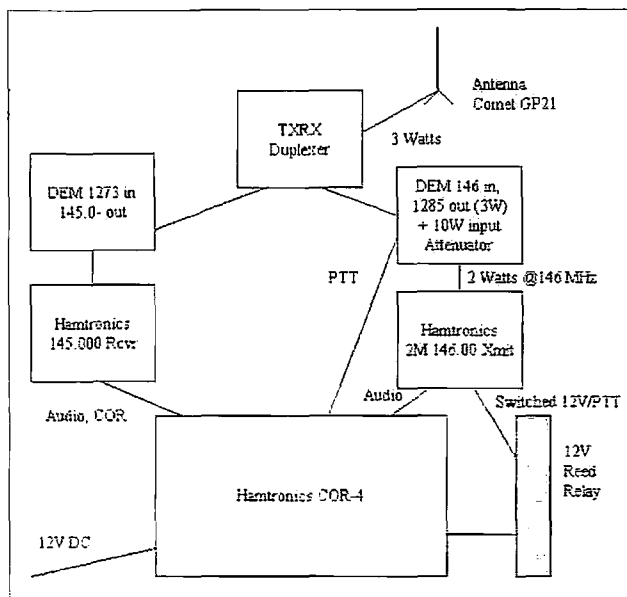


Fig. 1. NY9D 1285 MHz repeater block diagram.

attenuator from RF Parts, as well as a microwave-rated dummy load. The hamfest transverter was rated for a low-level (milliwatt) input, and the Hamtronics 2m transmitter could not be easily adjusted below 2 watts.

Soon the parts were in, and everything was wired together. I put the whole system in one of the TVRO cabinets I got from Paul. I put a metal shield in between the controller and 2m receiver and transmitter. In retrospect, I should have used separate cabinets, or a high-grade

more LMR-400 cable for my single chimney-mount. I also started buying some 1.2 GHz radios on eBay. I found a mobile rig, an Icom IC1200, and a couple of Icom IC12AT HTs. Prices on mobiles (even older 1 watt units) for this band seldom got far below the price of a new radio.

The moment of truth soon arrived. I turned on the DC power, and my callsign beeped out of the T81HT set to receive on 1285 MHz. (I tried to never hardwire any RF outputs to my HTs or frequency counters, but used

repeater-type cabinet with highly shielded compartments.

By this time there was no turning back. I checked the ARRL repeater directory for ads for duplexers. I called TX/RX Systems, and they said right away that I was entitled to a 20% discount as an amateur station. I have the model 28-97-01A. I also got Radio City to order a three-band Comet GP-98 antenna and some

NØBVE came booming in from 20 miles away, full-scale to my lousy site from his powerful antenna complex. I talked to him for a bit. The machine otherwise did not have good range at all. I took the transverters apart, replaced the RCA power jacks with feedthrough caps sold by Down East, and put ferrite beads and bypass caps on the power leads. (The transverters are not designed for repeater use, which requires lots of shielding and bypassing.)

Now the range was better. I checked the output power — 3 watts all the time into the duplexer, and hardly anything out from the duplexer. I think I had an oscillation someplace.

I ordered a factory-built transmit-only transverter (146 = 1285) from Down East. I took care to keep my “IF” frequencies 1 MHz apart. I added the optional high power (10W) input attenuator as well. This time, I got three watts into the duplexer and three watts out of the duplexer, and a range of over three miles from my 22-foot chimney-mount antenna. I think my old kit-built transmit transverter was definitely an issue here. I also moved the 2m receiver out of the controller/transmitter cabinet, and gave it its own box.

One constant theme of the discussions with local repeater experts was that we would need a rooftop site for this machine. Any significant coax or even hardline runs would lead to excessive signal attenuation on this band. A lucky contact with Ed Jacobson WBØVHF from the 3M Amateur Radio Club led to a meeting. Ed was enthusiastic about VHF and microwave work, and stopped by one day to examine the machine and take some notes.

Ed brought the idea of taking over my system before the club board. They went for it, and were happy with my agreement to basically give them the system, with the caveat that I would get it back if they ever got tired of it. I joined the club as an associate member, ordered up a new ID chip with the club call, and a Comet GP-21 1.2 GHz repeater antenna. Ed called back some time later and said they had 40 feet of spare 1/2-inch Andrew hardline at the

rubber duck antennas placed nearby.) All sorts of nasty static and feedback came out as well. I consulted Reuben, who said desense was my enemy from here on out. “Get some double-shielded coax jumpers,” he said. Those came from Cable X-PERTs. I walked around the block, and could reach the system. Reuben could not hear the machine from his location.

The first night,

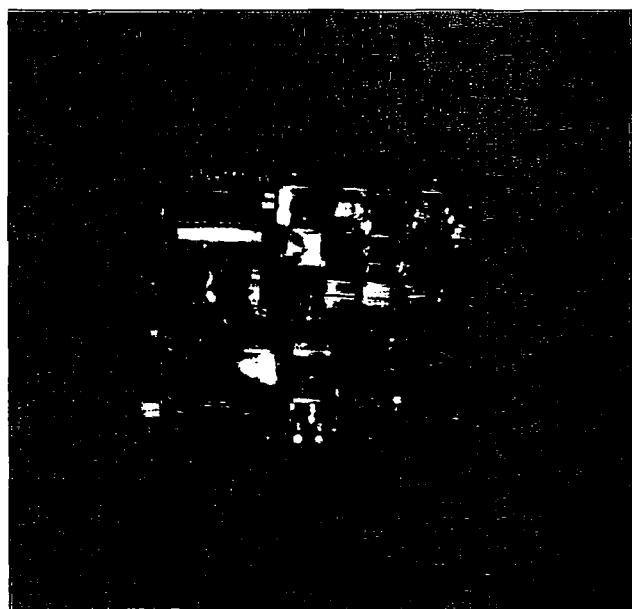


Photo B. A Hamtronics 2m receiver with COR.



## Transverter Math Summary

For the KK7B (separate LO board) transverters, you can correlate your LO crystals to the desired input or output frequencies according to the formulas below. The newer Down East (single board including LO) transverters use a different LO crystal frequency range. I believe your 2m IF should remain in the 2m amateur band, since you may be dealing with several watts of power.

Stock: 96.000 MHz crystal. Multiply by 6 in the LO to get 576 MHz. Then multiply by 2 in the transverters to get 1152 MHz. Add 144 MHz to get 1296 MHz. This is where a lot of the weak signal work is. Remember the transverters are simplex.

Repeater use: For work in the 1.2 GHz repeater subband, to maintain a 2-meter "IF" you need new crystals. For receive at 1273 (1285 - 12 MHz), you need 94.0833 MHz. For the transmitter on 1285.000, you need a 94.875 MHz LO crystal. Down East can order these for you. Make sure your transmit and receive "IFs" are 1 MHz or more apart, or you will likely have trouble in your repeater.

A frequency counter can let you figure out if your LO is working, and you can see the various frequencies at work in your system by poking around inside the transverter with a rubber duck antenna on the counter.

site and an available antenna mount. I led the "transmit inhibit" lines from my controller out to a rear jack for connection to the club's system controller.

We found headline N connectors at another hamfest, and Ed replaced the PL-259s with those on the existing feedline at our new site. Soon we were on the air. I looked around nervously at the other commercial repeaters sharing the site — no lights seemed to blink when I keyed up and gave my call sign. So far, so good.

Back on the ground, we were able to reach the machine from my T81AT on a Comet 3-band mobile antenna on my

Continued on page 14

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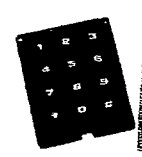
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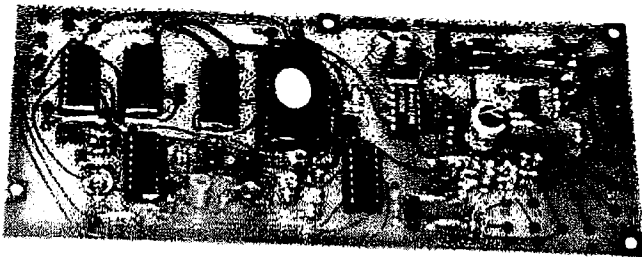


Photo C. The Hamtronics COR-4 repeater controller.

## Build a 1.2 GHz FM Repeater

*continued from page 13*

trunk well past the 20-mile mark on the way to a Wisconsin hamfest. Reuben said he was surprised and delighted at the coverage. The machine, with about 12 watts of ERP between the antenna gain and a little feedline loss, seem to be about even in terms of transmit and receive sensitivity and coverage. I put the parts from my hamfest Down East 3 watt in, 17 watt out amplifier into a proper cabinet, and may experiment with that. This amplifier can be connected between the existing transmitter and duplexer 1285 MHz input connector and would not need a T/R relay or switch.

I asked around about in-line coax lightning suppressors. The club did not use them, but every commercial machine on the site did. Others consulted on the topic said not to bother.

After returning from a business trip a week later, I jumped in the car and

keyed up the machine. Nothing was heard, all the way home. My wife said there had been a "ton" of lighting that day. All I could think of was the pile of credit card receipts that led us here and how many more would be needed for the lighting damage. I called Ed on his cell phone — we've got to get to the site.

The next morning Ed called me back — he said the machine seemed fine, and then he turned down the squelch — there was our ID. The one problem I was sure was fixed was back. I asked him to power cycle the receiver module — it was back on the air. The receive converter LO was not locking up again. We are down from the normal LO crystal frequency by almost 2 MHz, and the local oscillator should probably be adjusted a bit. Down East suggests tweaking the 8 turn LO choke.

After all this, we are still learning about this interesting band. We have some bragging rights in town, not only

that we have the highest-frequency amateur voice repeater in three states, but that we built it ourselves. We have a very minor problem still with some RF feedback, but if I can upgrade some of the rat's-nest of jumpers and adapters in between modules, that should settle down.

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SSB Electronics, 124 Cherrywood Drive, Mountaintop PA 18707. (570) 868-5643. [<http://www.ssbusa.com>].

TX/RX Systems, 8625 Industrial Parkway, Angola NY 14006. (716) 549-4700. [<http://www.txrx.com>].

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A standard analog multimeter scale, say 0 to 250 volts, is neither easy to read nor particularly accurate. Hence, I decided to create an expanded-scale AC voltmeter, reading between 110 volts and 135 volts. This idea isn't original — a vacuum tube version was available from RCA in the 1950s — but it's still a nice addition to the shack.

## Theory of operation

The principle behind an expanded-

scale voltmeter is simple — by floating one end of a voltmeter with a precision voltage reference, we can increase resolution and accuracy.

Suppose we want to measure the voltage of a battery that we know is somewhere between 5 and 6 volts DC. The simplest method, of course, is to set your voltmeter to the 0 to 10-volt scale and connect it across the battery terminals.

If you have a typical analog multimeter, you will have an accuracy of about 2% of full scale, in this case 0.2 volts. If

the “true” battery voltage is 5.5 volts, your meter could read anywhere between 5.3 and 5.7 volts and still be within its rated accuracy.

Suppose that you also have an accurate 5.000-volt power supply. By using it as a reference and reading the difference between the voltage standard and the unknown, you can use a lower voltmeter scale and significantly improve measurement accuracy.

In this case, you can use the 0 to 1-volt scale on the voltmeter, as the voltage reference “cancels out” 5.000 volts

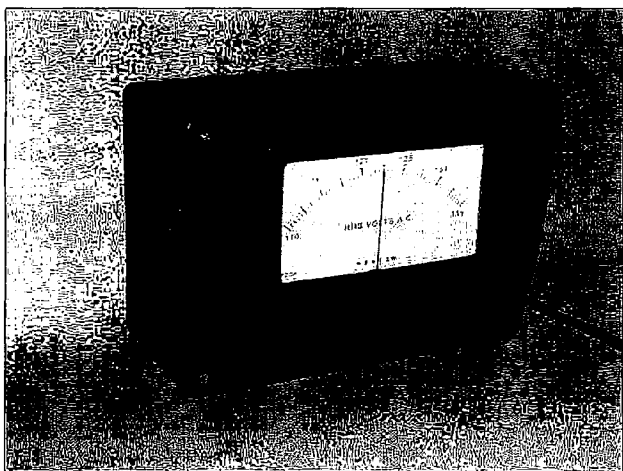


Photo A. The completed unit.

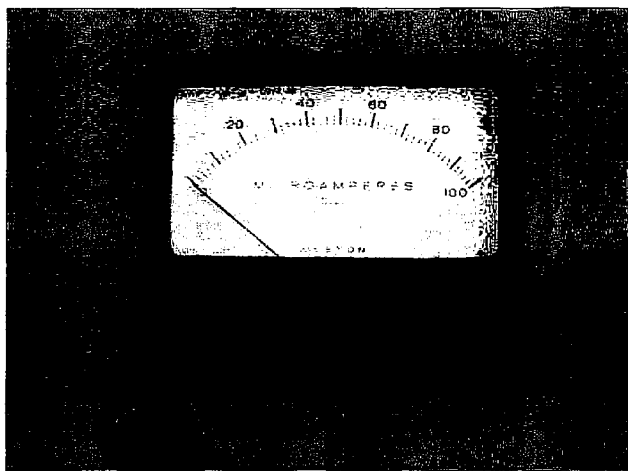


Photo B. I started with a Weston 0–100 µA meter.



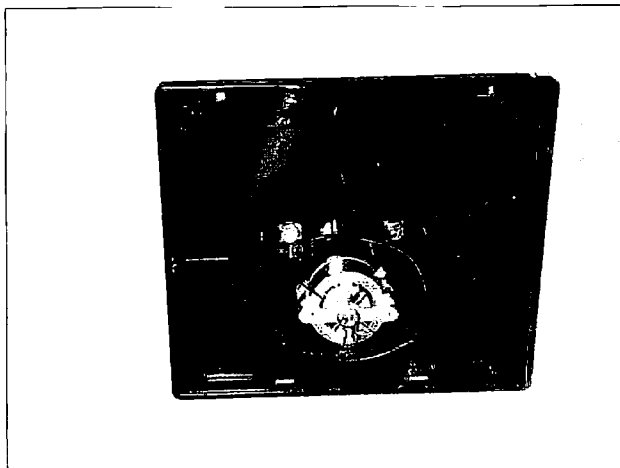


Photo C. View after disassembling meter case and removing scale plate.

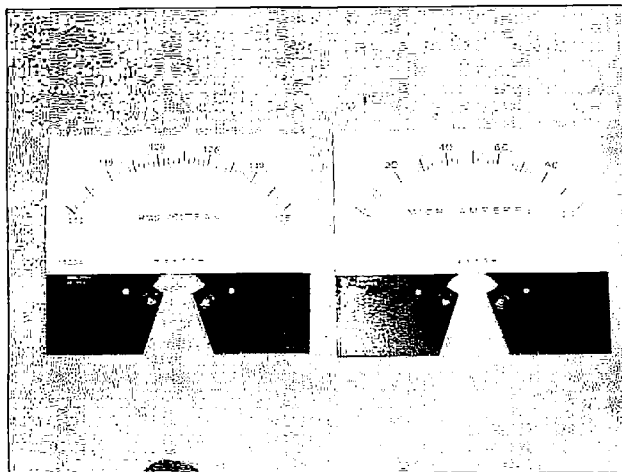


Photo D. The original and new paper scales.

of the unknown voltage. Using the same 2% voltmeter as before, the error is now only 0.02 volts (2% of the 1-volt full scale). A perfect voltmeter would read 0.50 volts, to which must be added the reference voltage. The limits of accuracy are now 5.48 and 5.52 volts, an order of magnitude improvement in error from the simple measurement technique. The voltmeter scale has, in effect, been recalibrated to read 5.00 to 6.00 volts, with an accuracy not 2% of full scale, but 2% of the difference between the maximum and minimum limits of the meter. This is the principle behind the expanded scale voltmeter.

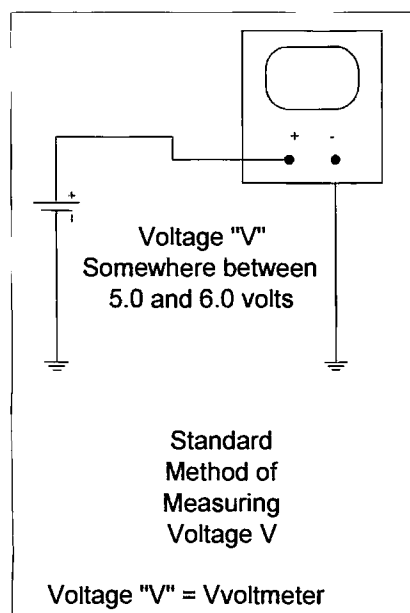


Fig. 1. Voltmeter on 0-10-volt scale.

Of course, this assumes that the reference voltage is accurate, as its error budget must be added to the voltmeter error. We'll take care of that in calibrating the overall instrument.

To extend this concept to an expanded scale AC voltmeter reading, we just need one more step; a rectifier to convert the AC voltage to DC.

### Circuit description

Since this is a junk box project, the circuit description will concentrate on concepts so that the builder can adjust important parameters to match the available components.

The left-hand portion of the circuit produces a stable DC reference voltage of about 5.1 volts. The right-hand portion of the circuit produces a DC voltage proportional to the AC line voltage. The meter and series adjustment resistors (R2 and R3) measure the difference between the DC reference and the DC proportional voltage.

### Reference voltage source

T1 is a small low-voltage transformer. I used a Stancor SW210, rated at 5-0-5 volts at 110 mA. The two secondary windings are connected in series to yield 10 VAC and feed a full-wave bridge rectifier, U1. The bridge I used is rated at 1 A, 400 V, but anything over 100 volts should be satisfactory. The objective is to produce around 15 to 20 volts to feed the reference subcircuit (Q1, R1, and D1) when the line voltage is at the lower limit

you have selected for the meter. This circuit only draws a few milliamperes, so you may see much more output voltage than expected, based only on the transformer rating. For example, my SW210 transformer should result in around 13 VDC, but in fact at only 100 volts line voltage, I measured 17.4 volts. Small transformers have significant series resistance and the output voltage will soar under light loading.

As a safety measure, both the primary and secondary of T1 are fused.

A transformer with a 12.6-volt secondary should work fine without any other changes in the circuit. If you have a 6.3-volt transformer, use a voltage doubler.

Q1 and R1 form a constant-current source, with the current set by the value of R1. Current flowing through R1 biases the gate of Q1 negative. Any change in current causes an offsetting change in Q1's bias thereby restoring the original current. I used an MPF102, but most N-channel JFETs should work in this circuit.

This simple circuit is quite effective, with a 50% increase in drain voltage causing less than a 2% change in current.

D1 is a 1N751A 5.1-volt zener diode. By feeding the zener through a constant-current source, instead of a simple resistor, we can further stabilize the reference voltage. I selected a 5.1-volt zener as the reference because zener diodes in this voltage range exhibit the lowest voltage change with temperature.



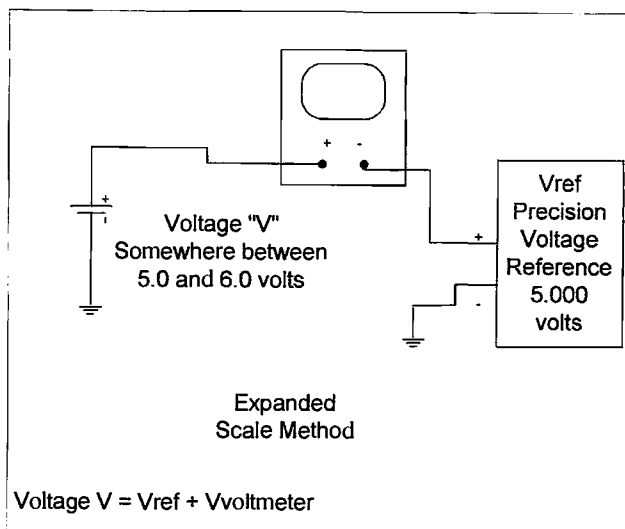


Fig. 2. Expanded-scale method.

An added refinement is to set the current through D1 to a value that minimizes changes in zener voltage with temperature. For the 1N751A, 5 mA produces essentially zero voltage change over the temperature range -25°C to +125°C.

Due to unit-to-unit variation in FET characteristics, it is necessary to select R1 to produce 5 mA through D1. Start with 270 ohms for R1 and measure the current. (You can just measure the voltage across R1 and calculate the current with Ohm's law — divide the voltage across R1 by its value in Ohms.) If the current is below 5 mA decrease R1, or increase it if the current is above 5 mA. A zener current between 4 and 5 mA will be fine. You could, of course, use a 1k pot and adjust it to produce 5.0 mA, but since this is a "select once and forget" adjustment, hand selection of an appropriate R1 works just as well.

If you don't want to use the constant-current zener approach, a 78L05 low-power 5-volt reference can be substituted. However, a 78L05 has a typical line regulation of 10 mV, or about 0.2%. This is not as good as I measured for my circuit, but provides reasonable results.

The combination of constant-current source and zener yields a remarkably stable voltage reference. Varying the AC input voltage from 100 volts to 135 volts only shifts the zener voltage 500 microvolts, representing a 0.01% shift in the 5.1-volt reference.

### Proportional DC voltage

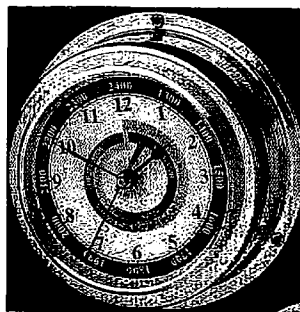
R5, R6, and R7 form a voltage divider, fed from the input line voltage. A variable sample of the line voltage is rectified by D4 and partially filtered by C2.

The component values shown in the schematic will work for a meter sensitivity between 50  $\mu$ A and 500  $\mu$ A. If your meter requires 1 mA or more current, it may be necessary to reduce R5 and R7 proportionally.

R5 dissipates about 0.5 watts at maximum line voltage and hence should be rated at 2 watts or more. Since the value of R5 directly affects the sample voltage, it should be a metal film resistor for good temperature stability. R7 should also be stable, but since R5 swamps its effect on accuracy, a standard carbon film resistor is acceptable.

C2 and R4 are selected to provide some filtering of the rectified sample voltage, but not complete filtering. About 1.5 volts p-p of ripple can be measured across C2. The reason C2 is intentionally small is to permit the meter to react to short fluctuations in line voltage. If you have an under damped meter and can see the pointer responding to the term ripple, increase C2.

R6 is used to adjust the meter to zero at the minimum desired voltage reading. With a 100  $\mu$ A meter, the values shown permit setting the meter zero between 90 volts and 125 volts.



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In building the expanded scale meter, I first tried to derive the proportional voltage from the secondary of T1. Unfortunately, I found that the particular transformer that I used did not yield an acceptable sample voltage — most likely due to core saturation — with a maximum error of 2.8%. In contrast, sampling the input line voltage as shown in the schematic produces less than 0.1% error.

### Meter

The meter section of the circuit consists of R2, R3, D2, D3, and M1.

R2 is adjusted to calibrate the meter to a full-scale reading, while R3 is a safety resistor to prevent M1 from experiencing excessive current during adjustment of R2. D2 and D3 are an additional safety measure and shunt excess current away from the fragile meter coil.

The R2 and R3 values will be driven to some extent by your selection of M1.

R3 should be selected to limit the maximum current through M1 to a safe value should R2 be inadvertently set. The maximum difference between the reference and the sample voltages is about 1.25 volts if your meter is set for the range 110 to 135 volts. The 100  $\mu$ A meter I used has a series resistance of 2.5 k $\Omega$ . In the absence of R3, therefore, the maximum current through M1 would potentially be 1.25 volts/2.5 k $\Omega$



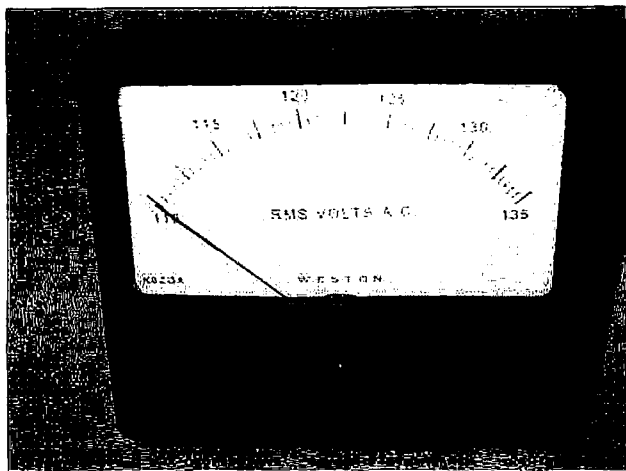


Photo E. The rescaled meter looks as good as the original.

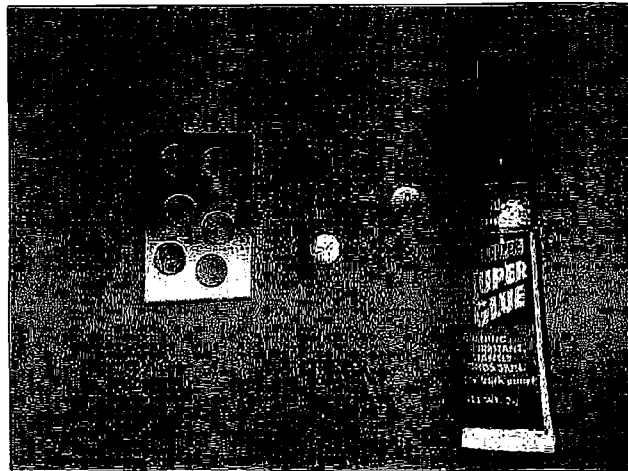


Photo F. Key ingredients for "Manhattan-style."

= 500  $\mu$ A. This is a bit high for comfort, so a series resistor of 1.2 k $\Omega$  was used at R3. The series resistance is now a minimum of 3.75 k $\Omega$  and the corresponding current is 333  $\mu$ A, a more reasonable value. A further safety measure consists of the back-to-back diodes D2 and D3 across the meter. These limit the maximum current through M1 to 280  $\mu$ A based on the 2.5 k $\Omega$  internal meter resistance and a diode knee voltage of 0.7 volts.

Should R7 open up, a substantial increase in voltage might be seen across the meter. In this case, D2 and D3 will protect the meter movement. In addition, when the meter is powered up or powered down, the different charging and discharging rates of C1 and C2 will cause the meter to pin negative for a few seconds. D2 and D3 will prevent damage to the meter during this time.

### Rescaling the meter

The following discussion assumes that the meter you have selected is not sealed and can be disassembled. My experience with "unsealing" sealed meters is not good.

Prepare a clean, clutter-free working place and assemble the tools you will need. A set of jeweler's screwdrivers, small pliers, and a miniature wrench set will be helpful. Many of the parts are quite small and a headband magnifier is quite helpful as well. A small plastic box to store the removed parts is a good idea.

I started with a Weston 0–100  $\mu$ A meter.

Carefully disassemble the meter case and remove the scale plate.

We will now make a new meter scale, print it, and attach it to the back of the old meter place.

There are several methods to make a new meter scale. I originally started with the excellent meter scale software written by James Tonne WB6BLD, available at his Web page [<http://www.qsl.net/wb6bld/>]. After developing the scale I wanted, I printed it on a sheet of transparent plastic and overlaid it on the meter scale plate I had removed from my meter. Much to my surprise, I found that Weston had used nonlinear spacing and that the spacing between calibration marks varied as much as 20% from one end of the meter to the other. Although WB6BLD's software permits some nonlinear adjustment, it wasn't possible to get an accurate fit to the old scale.

So, I reverted to an old tried and true method. I made a 200% enlargement of the meter face on a copier. Using 200% enlargement, my Weston meter scale almost filled an 8-1/2- x 11-inch page to create a working master. Using typist's correction fluid, I blanked out the old numbers and the term "Microamperes D.C.," keeping the scale on the working master. Using Microsoft Word, I then prepared new numbers and an identifying legend for the meter. I used a font close to the original and adjusted its size and tracking

to match the 200% enlargement. I then cut the numbers and legend out and pasted them onto my working master, using typist's correction fluid to mask any stray marks. A trick to avoid shadows from the pasted up bits is to paint the edges of the paste-up with typist's correction fluid. When you are satisfied with the working master, make a copy at the reverse of the original enlargement. Since I used 200% enlargement, I needed 50% reduction. It's worth checking the reduction against the original meter scale at this point, since the enlargement and reduction scales on copy machines are not always accurate. It may be necessary to play with the reduction factor a bit in order to obtain an exact duplicate of the original. Copy machines also often have a bit of "differential stretch" whereby the enlargement and reduction factors are slightly different for vertical and horizontal dimensions. When you are done, it should be possible to overlay the new scale on the original meter plate and have the dial lines align as exactly as can be seen using a magnifier. You will also get the best appearing results if the copy paper you use is bright glossy white. I used paper intended for inkjet printers and the scale turned out brighter than the original white paint.

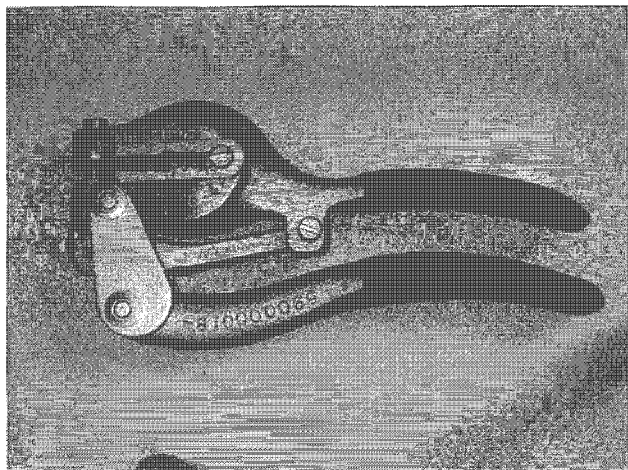
If you have a flatbed scanner attached to your computer, you could scan in the meter face and edit it electronically.

The new paper scale is then attached to the back of the original metal scale plate. I used a repositionable artist's









**Photo G.** I punched out the copper pads with a Roper-Whitney No. 5 Junior hand punch.

## All-Star Expanded-Scale AC Voltmeter

*continued from page 19*

important to protect against inadvertent contact with potentially lethal voltage. The plastic box provides an additional layer of protection. Note also that one side of the AC line is common with the negative side of the low voltage reference DC supply. While normally I would have used the copper foil of the main PC board for the negative low voltage DC connection, this would mean that one side of the AC line was connected to what is usually considered "ground." This could lead to an unpleasant surprise or worse. If you use my wiring technique, please use a 3-wire (hot, neutral, and ground) line cord and connect the

ground (green wire) to the copper foil of the board. The photos show a two-wire line cord that I use with an isolation transformer for testing and calibration. If you use a metal box to house this project, the box should also be connected to the AC line ground wire.

## Checkout and calibration

After construction, carefully check your wiring for errors. If you use the Manhattan-style construction, check the resistance between the PC foil and the rest of the circuit. This should be an open circuit.

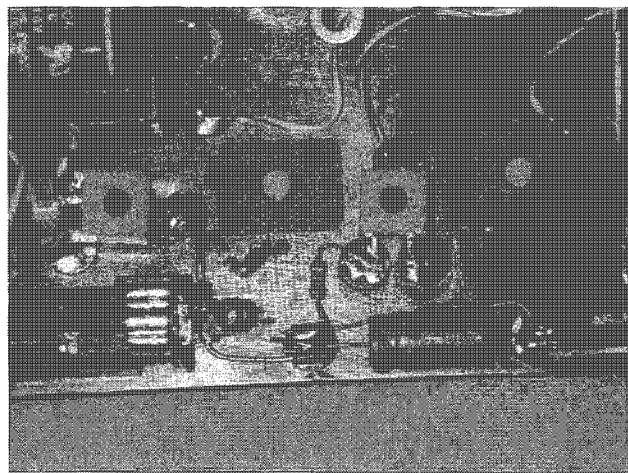
Disconnect M1 from the circuit for the following initial checkout.

Connect the circuit to a variable AC power source, such as a VARIAC® and place an accurate digital voltmeter across the AC line. Please remember that a standard VARIAC is not isolated from the AC line and that inadvertent contact with the AC line can cause severe shock or injury. Please be careful! I strongly recommend using an isolation transformer between the VARIAC and the expanded scale voltmeter at any time when the case is open and voltage is exposed.

Always unplug the meter from the VARIAC before attaching or detaching clip leads! The steps below require you to measure voltages and adjust potentiometers whilst AC line voltage is applied. Please be careful during this process! Remember the old rule of keeping one hand in your pocket when working around dangerous voltages.

Set the VARIAC to the "zero" voltage level you have selected. Check the voltage across D1 with an accurate digital voltmeter. It should be 5.1 volts  $\pm 0.25$  volts. (If you haven't already determined the proper value for R1, do so now.) Note this value as  $V_{ref}$ . Increase the VARIAC to the voltage level you have established as the "full scale" voltage. The actual voltage level is not so important. It is much more important that  $V_{ref}$  should be essentially unchanged as the AC line voltage is varied. If  $V_{ref}$  changes more than a few millivolts, you have a problem with Q1, R1, or D1. (My prototype changed only 0.5 millivolts.)

Move your digital voltmeter to read the voltage across C2. Set the VARIAC to the zero voltage level you have selected. Adjust R6 through its range. You should see the voltage across C2 vary from 4 volts (or less) to 6 volts (or more). Set R6 so the voltage across C2 is equal to  $V_{ref}$ . If you can't obtain this range of voltage adjustment, check R5, R6, R7, D4, R4, and C2 and the associated wiring.

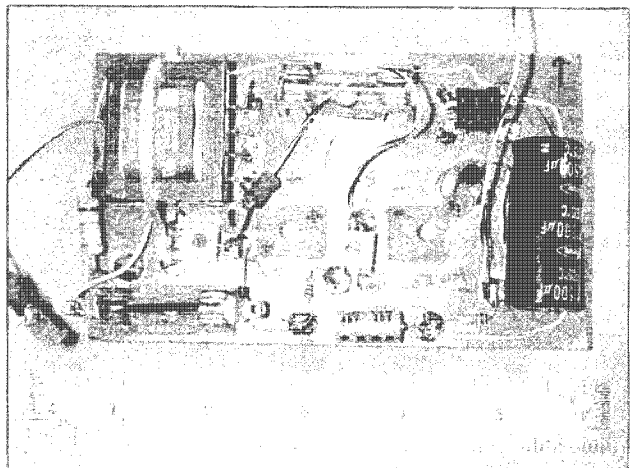


**Photo H.** Wiring techniques can be seen here.



**Photo I.** More wiring.





**Photo J.** The completed circuit board is mounted on the back of the meter, using the two meter terminal studs. It is necessary, of course, to remove the copper foil from the area around the meter lugs. I used a milling machine, but you could etch it chemically, or cut it out with an Exacto knife and peel the copper from the fiberglass substrate.

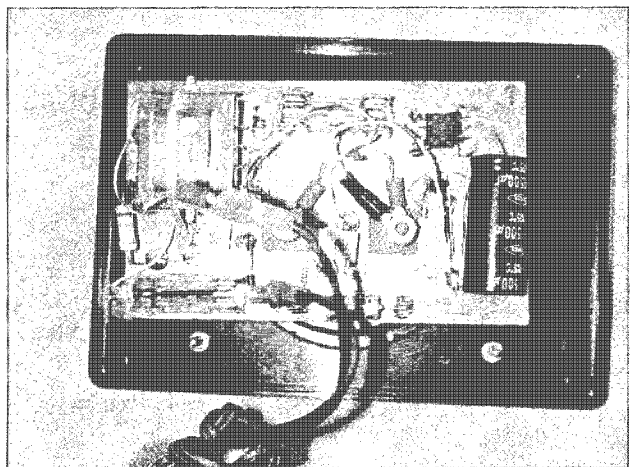
Disconnect the circuit from the VARIAC.

Preset R2 to midrange and connect M1 into the circuit.

Reconnect the circuit to the VARIAC and set the AC line voltage to the zero voltage level you have selected.

Using a nonmetallic adjustment tool carefully adjust R6 to zero the meter. Use a nonmetallic tool to help reduce the risk of contacting line voltage.

Increase the AC line voltage to the full-scale value and, using the non-metallic adjustment tool, adjust R2 carefully until the meter reads full scale.



**Photo K.** The board installed in place.

It may be necessary to repeat the R2/R6 adjustment once or twice, as they interact slightly.

Disconnect the circuit from the VARIAC and install in the box.

Check the accuracy of your meter at several points over its scale range. I found that my expanded-scale voltmeter is within 0.2 volts of my HP 3468 precision digital meter at the worst point

and that almost all readings are within 0.1 volt.

Of course, the accuracy of your expanded scale meter is directly tied to the accuracy of the digital voltmeter used in calibration. A standard, "run-of-the-mill" digital voltmeter obtained for a few dollars may be surprisingly inaccurate when reading AC voltage. I recently received a "free" 3-1/2-digit DVM when ordering some equipment. This DVM is rated as  $\pm 0.8\%$  of reading and  $\pm 3$  digits on the 0-200 VAC scale. For 125 V, therefore, the error limit would be 1.3 volt. If you can borrow a more accurate DVM, such as a Fluke 187 or 189 ( $\pm 0.4\%$ ,  $\pm 40$  digits;

resolution 0.01 volts), the error will be reduced to 0.9 volts. Even a laboratory-grade instrument, such as the HP 3468, is only specified to be within 0.727 volts when reading 125 volts. However, when reading AC line voltage, my Fluke 189 agrees with my HP 3468 within 0.05%, while the

"free" DVM diverges from the Fluke 189 and HP 3468 by about 1%.

One point noted when calibrating the expanded-scale meter is that the AC line is not particularly stable; appliances cycling off and on in the house can cause 0.5-volt variations. Hence, some degree of "eyeball averaging" may be necessary when calibrating the meter.

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# Travels with Henryk — Part 2

*SMØJHF shares some photos — and the fun of hamming.*

*Poland is a central European country with a stormy history. Political changes in this region some 12 years ago resulted in a more independent governing system. The country has recently become a member of NATO. Some 40 million people live here, but just as many Poles live abroad, scattered around the world.*

Approximately 15,000 licenses are issued in Poland, with prefixes SP, SQ, SN, and 3Z. Foreign nationals visiting or settled here are given an SO prefix. As of January 1st, 2001, the CEPT agreement is effective in Poland. The national organization, PZK, an IARU member, has its headquarters in Bydgoszcz nowadays, [<http://www.pzk.org.pl>]. During last year's IARU HF championship, PZK's "headquarters" station SNØHQ did extremely well.

Chris SP7GIQ is 45 years old and received his license at the age of 16. He learned contesting and building

yagi antennas at clubs near Warszawa, Poland. About ten years ago he moved to the small town of Lask, erected a few towers, built quad antennas, and started winning contests (see **Photos B and C**).

When last checked, his station consisted of

10m — 5-element quad at 27m,  
5+5+5+5 stacked quads, top at 35m;

15m, 20m — 4-element quad at  
27m, 4+4 stacked quads at 35m;

40m — 2-element quad;

80m, 160m — vertical for transmitting, Beverage wires for receiving;

IC-751A, plus similarly ancient Alpha amplifier.

Chris's E-mail address is [sp7giq@pro.onet.pl].

\*\*\*

Kazimierz SP2FAX is 47 years old and got his license more than 30 years ago. Soon thereafter, he founded a club (SP2PDI) with a serious DX and contest approach right in his home town of Bydgoszcz, Poland. A number of cubical quads were built, but it seems that they were difficult to keep in the air.

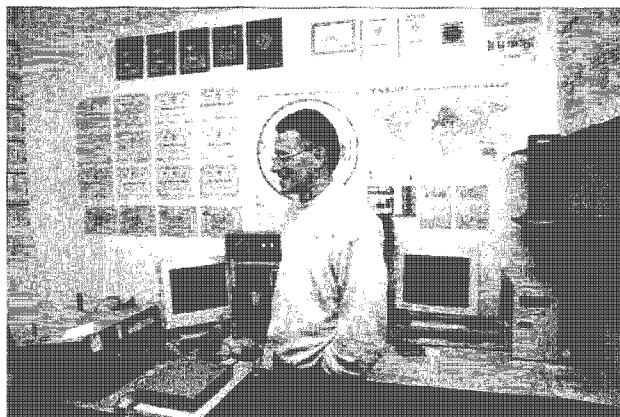


Photo A. Chris SP7GIQ shows off his shack in Lask, Poland.

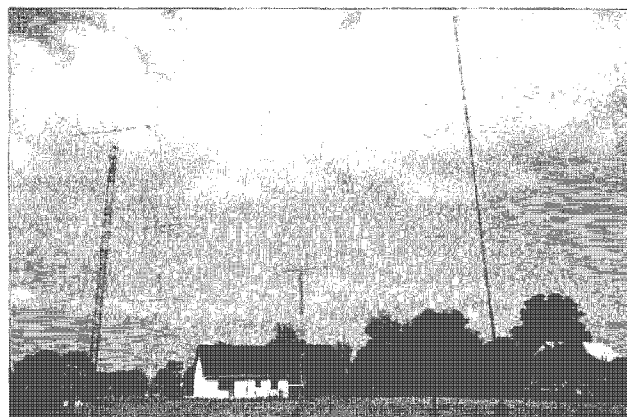
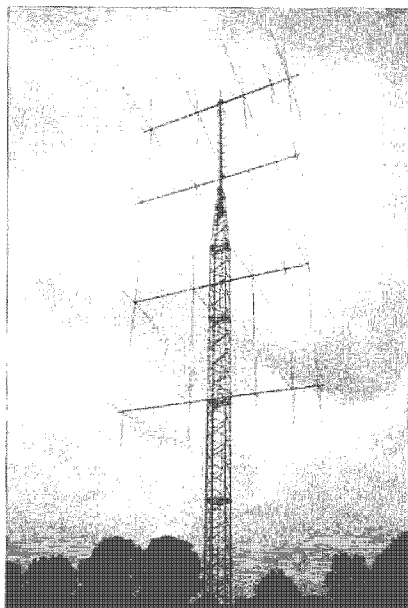


Photo B. SP7GIQ's antennas are really up there.





*Photo C. SP7GIQ's stacked 5-element quads.*

In 1981, all amateur radio activity was suspended in Poland by martial law, and Kazimierz closed his mind and heart to ham radio — but only until 1995, when he came back to our hobby in a grand manner. He bought a piece of land, after first checking the ground conductivity charts. He set up a few towers with large yagi arrays.

Refer to **Photos D and E** to see what he has today:

10m — 6-element yagi at 32m, 6-element yagi at 23m;

15m — 6-element yagi at 32m, 6-element yagi at 20m;

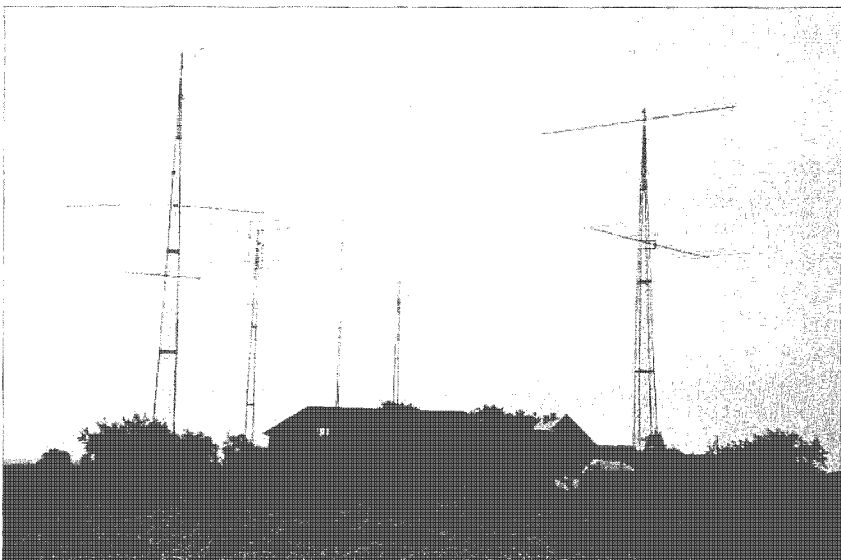
20m — 6-element yagi at 46m, 6-element yagi at 24m, 3-element yagi fixed south;

40m — 3-element yagi at 44m;

80m, 160m — vertical for transmitting. Beverage wires for receiving:



*Photo D. Kazimierz SP2FAX relaxes in his shack in Bydgoszcz, Poland.*



*Photo E. SP2FAX's large yagi arrays suit the scale of his home.*

FT-1000, plus a home-brew amplifier.

His E-mail address is [sp2fax@poczta.wp.pl].

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# VTVMs and FETVMs

*Theory and practice.*

*When the loading presented by a volt-ohm-milliammeter (VOM) is too great, the vacuum tube voltmeter (VTVM) or field effect transistor voltmeter (FETVM) is there to save the day, or at least save the time needed to calculate the loading effects.*

The VTVM has been largely supplanted by the FETVM; they use the same principles but different components. Vacuum tubes are hard to come by and expensive compared to field effect transistors (FETs), which in many respects are better. Since vacuum tubes are almost passé, the emphasis here will be on FETVMs. A design example is given for an FETVM.

Both the vacuum tube and N-channel FET are voltage-operated devices that require a positive supply: They respond to the voltage on their input, the voltage on the grid for a tube and the voltage on the gate for a FET. Both offer an almost infinite impedance. The FET actually comes closer to being an infinite impedance than the vacuum tube. The input resistance of an FET is several orders of magnitude greater

than the grid current of a tube. Grid current is typically a microamp, while gate current is typically a picoamp. A picoamp of gate current can be ignored except when you have to pick the fly specs out of the pepper for an electrometer, an ultra-high-resistance voltmeter.

Some of you new techs may not be familiar with tubes, and some of you old guys may have forgotten some of the fine details. In any event, the grid in a tube intercepts some electrons, and while there are only a few electrons intercepted, they represent maybe a  $\mu\text{A}$  or so of current, but into a 1 meg grid resistor that's a volt. That can't be ignored.

In a VTVM contact current is usually balanced out by another similar tube working into an equal grid resistance. For example, a 12AU7 dual triode is often used. One half for the actual voltmeter and the other half just to balance out the contact grid current. Of course, contact current could be balanced out manually, but given the drift of tubes, that would be a cumbersome solution.

Both FETs and vacuum tubes look like an infinite resistance to the circuit under test. The voltage is indicated on

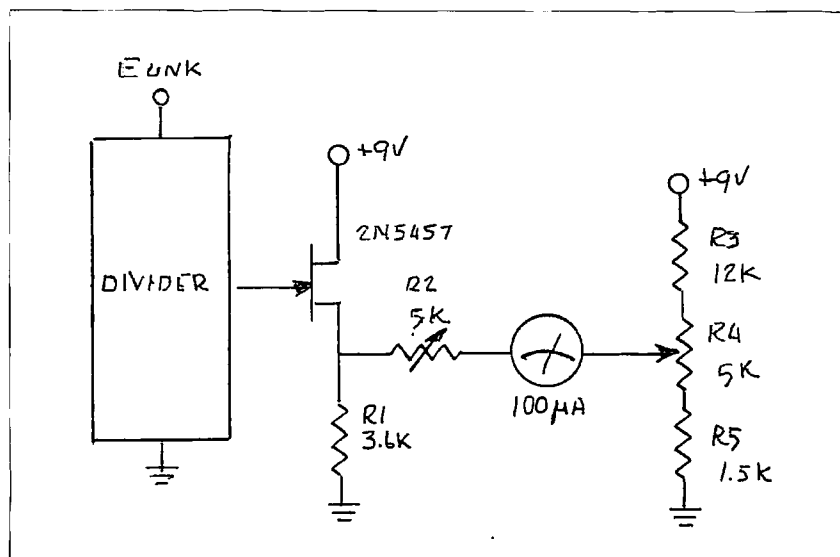


Fig. 1. A simple FETVM can have sensitivities of 1 volt full scale.



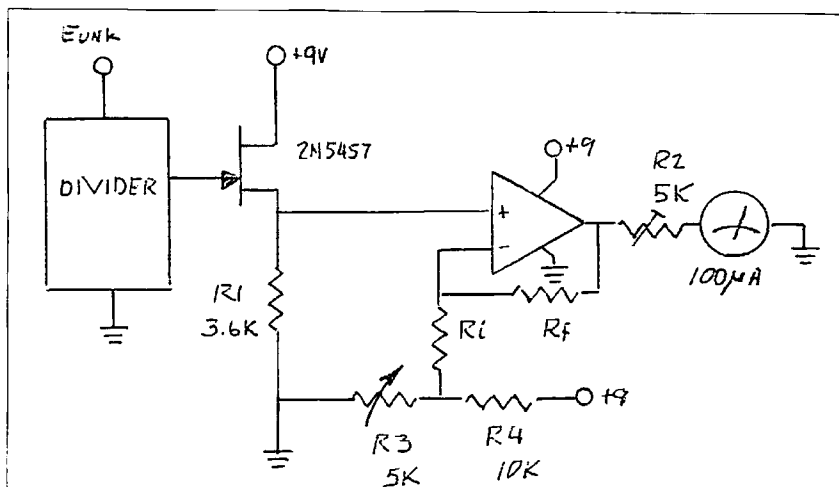


Fig. 2. Higher sensitivity can be achieved with an op-amp driving the galvanometer.

a conventional d'Arsonval galvanometer (named after the French physicist, Arsene d'Arsonval). The galvanometer requires a small current of 50  $\mu$ A to 1 mA to deflect the voltage indicating needle. The tube or FET essentially isolates the galvanometer from the voltage being measured.

The FETVM is simpler than its vacuum tube counterpart because there is practically no contact current to be balanced out and it operates with a single battery supply. Fig. 1 shows a possible FETVM. The circuit is basically a bridge with one side of the bridge composed of an FET source follower and the other side a resistance divider. A variable calibration resistor R2 in series with the galvanometer sets the current or deflection for a given gate voltage. The galvanometer connects to a zeroing pot R3 in the divider side of the bridge. The source follower circuit is used instead of an amplifier because of the improved stability as a result of the 100% negative feedback. An amplifier can provide gain and increased sensitivity, but a bias voltage is needed. A source resistor can provide the bias but it would cause a loss in gain. The complications of a separate battery weigh against it. The source follower seems the better choice.

The zero pot is adjusted for zero when the input is shorted. The calibration control is a one-time adjustment to indicate a known voltage applied to the input. The known voltage is usually a battery, but a divider on the

supply can also be considered until a calibrated source like a standard cell is available.

In the circuit shown in Fig. 1, the 3.6k source resistance R2 controls the source current of the FET and the gain. The gain of a source follower is often assumed to be unity, but in fact it is always less than one.

The gain of a source follower is  $V_{G_s} = G_m R_s / (1 + G_m R_s)$ .

The  $G_m$  of the FET is  $G_m = 2I_D / (V_{off} - V_{gs})$ , where  $I_D$  is drain current, and  $V_{off}$  is the voltage needed to reduce the drain current to zero.  $V_{gs}$  is the gate-to-source voltage that produces  $I_D$ .

$V_{off}$  is not always given in the data sheets but it can be easily measured: Measure the drain current as the gate is made increasingly more negative (the source is made more positive with respect to the gate) until the current is zero or at least less than 1  $\mu$ A. For a typical 2N5457  $V_{off}$  is 3.06V and  $V_{gs}$  is 1.81V for  $I_D = 0.5$  mA. These conditions will exist when R1 is 3.6k. Under these conditions  $G_m$  will be  $8 \times 10^{-4}$ , and the voltage gain of the source follower  $V_{G_s}$  0.74. When 1 volt is applied to the input, the source voltage increases 0.74V to 2.55 volts. The current in the 1k galvanometer will be 100  $\mu$ A when the voltage at the arm of R4 is 1.81V, and R2 plus the galvanometer is approximately 7.4k.


Measuring voltages greater than 1 volt requires a voltage divider that reduces the unknown voltage to 1 volt at the gate. The voltage divider essentially

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determines the input resistance of the meter and the scales of the meter. The meter's scales usually have a ratio of 1 to 3. Part of the divider is usually a built-in 1 meg resistor in the probe that isolates the circuit under test from the distributed capacitance of the divider.

For high input resistance dividers, precision high-value resistances are needed. High-value precision resistors are hard to come by, but Victoreen, Cleveland, OH, tel. (216) 248-9300, has high-voltage resistors available with values in the hundreds of megs. Obtaining and maintaining a high resistance is primarily a problem of layout and cleanliness. Leakage across a switch or PC board will lower the input resistance and upset the accuracy. Most VTVMs have input resistances of 10 megs, which is a compromise of what is practical with what is possible. Since FETs have much lower contact current, they can have much-higher-resistance input dividers.

Higher sensitivity in a source follower meter can be obtained with an op amp driving the galvanometer as shown in Fig. 2. The op amp's noninverting gain is  $1 + R_f/R_i$ , and the input resistance is essentially infinite. The inverting input becomes  $(1 + R_f/R_i)E_i$  in the output. When the noninverting input voltage is +1.81V, and the inverting input is +0.181V, the output is zero. Op amp gains of 10 or so can result in full-scale sensitivities of 0.1V.

R2 is the calibration rheostat. R4 is the zero pot. Zero will change as the supply battery voltage changes. Therefore, adjust zero first and there will be no interaction between adjusting R4 and R2.

The schematic of a typical VTVM is shown in Fig. 3. A vacuum tube requires a power supply in the range of 150V to 250V as well as a heater supply, and is operated from the AC mains. While this can be a bother, during the heyday of vacuum tubes, the advantages of the VTVM outweighed the disadvantages of being tied to the line.

In Fig. 3, the two halves of a 12AU7 are used as a differential cathode follower. The input to V1A is the unknown voltage and the input to V1B is contact voltage. The pot R3 balances out the differences in voltages at the cathodes of V1A and V1B. Assuming equal grid currents and equal R1 and R2, the cathode currents and cathode voltages will be equal when R3 is centered and no current will flow in the galvanometer. A voltage on the grid of V1A will increase the cathode voltage and upset the balance, and a current will flow in the galvanometer. The rheostat R4, the calibration control in series with the galvanometer, determines how much current flows for a given imbalance. R5 ensures a constant current to the differential amplifier and reduces the variations

in the cathode follower operation due to supply voltages' variations.

The unknown input voltage is reduced to the design standard input voltage for the meter with a voltage divider. A voltage divider that divides the unknown input to 1 volt is shown in Fig. 4. Fig. 4(a) shows a 10 meg divider while 4(b) shows a 100 meg divider. The voltage divider has no influence on the operation of the volt-meter except to set the scales and determine the input resistance of the meter.

In many VTVMs, the lowest range is in the order of 3 volts full-scale. The sensitivity of the VTVM or FETVM depends on the gain of the tubes or FET and sensitivity of the galvanometer. An FETVM can have sensitivities of less than 1 volt without benefit of an op amp.

Op amps can provide gain that increases the sensitivity of the meter to 10mV. Op amps can be married to VTVMs, but it's not a good match because an extra regulated low supply is needed. An FET marries to an op amp much more readily. Solid state op amps were not even on the horizon when vacuum tubes ruled, and the sensitivity of the usual VTVM was not particularly high. Now, with FETs and op amps, tubes have been pushed into the background. FETVMs are now the high-resistance analog instrument of choice. 73

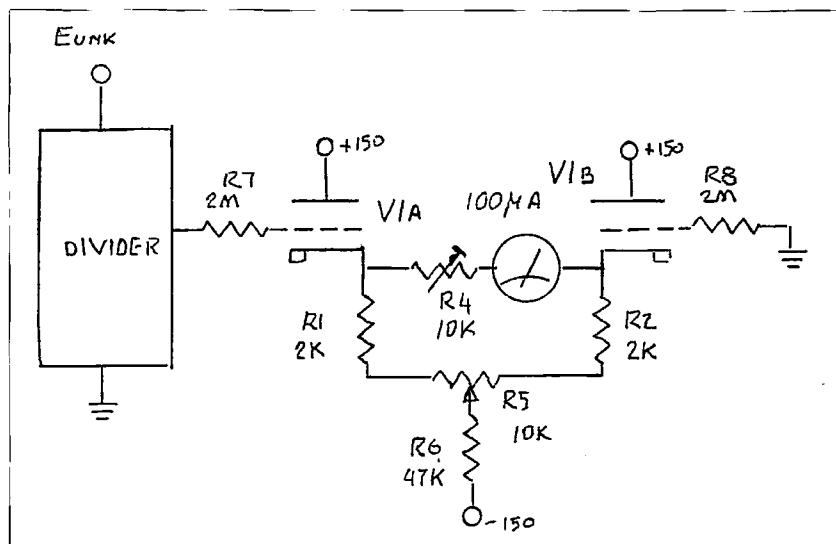


Fig. 3. A typical VTVM uses a dual triode.

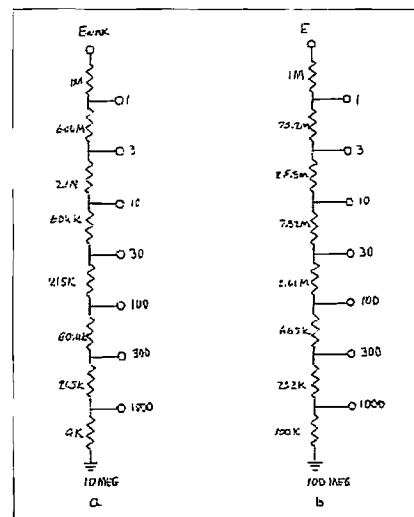


Fig. 4. A voltage divider usually has 1 and 3 scale ranges.



# The ABCs of IRCs

*Just what ARE International Reply Coupons, anyway?*

*Having worked that new country, IOTA, or whatever you've been chasing, you will quite likely want to get his QSL in written confirmation of the QSO. One of the most convenient ways to obtain your much-wanted card, particularly from a foreign station or his QSL manager, is by the use of International Reply Coupons (IRC).*

Unfortunately, much myth and misinformation surrounds what is and is not a "correctly" stamped and valid IRC, which is often compounded by different countries postal administrations' interpretation of the rules, so the purpose of this article is to set the record straight.

An IRC is a device by which a person in one member country of the Universal Postal Union (UPU) can prepay the return airmail postage cost of a letter of a specific maximum weight from a different UPU member country. At

the time of writing and in theory at least, IRCs are exchangeable in all countries with the exception of Taiwan. UPU member countries may decide not to sell IRCs, but their exchange is compulsory in all countries.

There are three types of IRCs in wide circulation: There are two versions of the type C 22 and the more modern type CN 01 (old C 22). The front text of all versions is printed entirely in French, but there is a translated version in English as well as Arabic, Chinese, German, Russian,

and Spanish on the reverse (Fig. 1). The earlier versions of the C 22 (Fig. 2), which was available for sale until the early 1990s (and which are still in circulation today), says that "this coupon is exchangeable in any country of the Universal Postal Union for one or more postage stamps representing the minimum postage for an unregistered letter sent by surface to a foreign country." The more modern CN 01 (Fig. 3) and the C 22 (Fig. 4) both say exactly

*Continued on page 28*

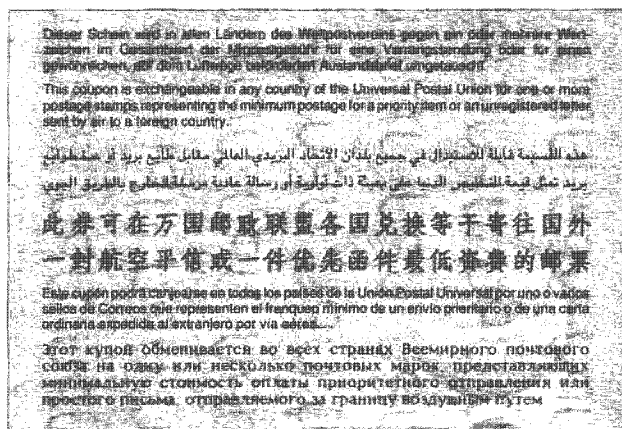


Fig. 1. The reverse side is a translated version of the front text in English as well as Arabic, German, Russian, and Spanish.



Fig. 2. The front side of the earlier versions of the C 22, which was available for sale until the early 1990s.



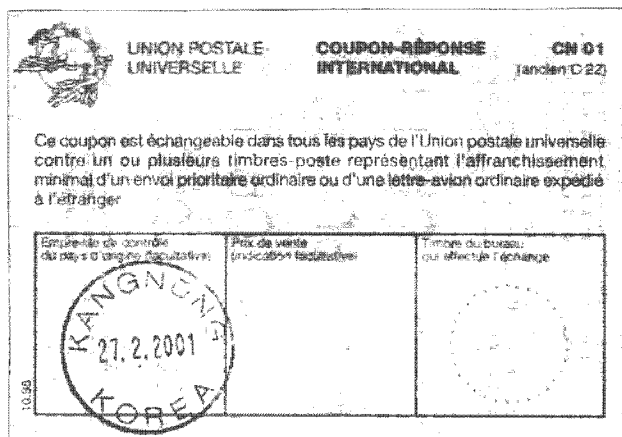


Fig. 3. The front side of the more modern CN 01.



Fig. 4. The front side of the more recent versions of the C 22.

## The ABCs of IRCs

*continued from page 27*

the same, except that the word "surface" has been replaced by "air."

The present CN 01 style was on sale until 31st December 2001. On 1st January 2002, a completely new style of IRC was introduced — also known as the CN 01. This new type of IRC is larger than those presently in circulation and will remain valid until 31st December 2006. The name of the country of origin will be printed on these coupons as a matter of course. Also printed on them, amongst other things, will be a standardized UPU bar code containing the ISO code of the country and the date of printing. Each country's postal administration will have the option of printing the selling price on the coupon itself.

There is, at present, no theoretical

limit to the period of exchange for IRCs, although postal officers can, not unreasonably, satisfy themselves as to their genuineness, particularly in respect of the older versions. In my own experience and if properly stamped, either type is generally accepted without question in exchange for the current minimum airmail postage. This may change in the light of the new style of CN 01.

IRC's can be bought "new" over the counter of the larger post offices at a current cost of £0.60 each and may be hand-stamped in the left-hand box by the issuing office. This box is marked "Empreinte de contrôle du pays d'origine (facultative)." This means: "Control stamp of the country of origin (optional)." Some IRCs have the name of the country of origin preprinted in red in the left-hand box (Fig. 5). Even with this preprinted information, there

can be a hand stamp from the issuing office over this writing. Contrary to popular opinion, the hand stamping by the issuing office or the overprinting by the country of origin is optional and the lack of this detail does not invalidate the IRC. Ideally, and where used, the hand stamp should include the date of issue, but this is not essential. For some unknown reason, IRCs issued in France do not always bear the date of issue, but merely the name of the issuing office (Fig. 6).

When presented in exchange for postage stamps, the receiving office should legibly date-stamp the right-hand box. This is a mandatory requirement to validate the IRC. This box is marked "Timbre de bureau qui effectue l'échange." This means: "Stamp of the office making the exchange." One IRC is currently exchangeable in the U.K. for £0.45 worth of postage stamps or an aerogramme.



Fig. 5. Some IRCs have the name of the country of origin preprinted in red in the left-hand box.



Fig. 6. Some IRCs issued in France do not always bear the date of issue — merely the name of the issuing office.



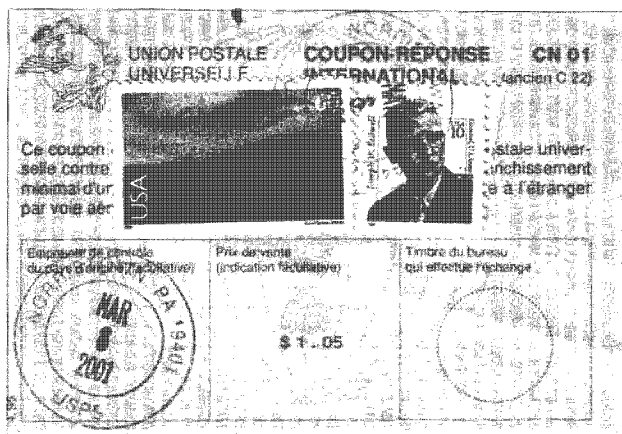


Fig. 7. The issuing office may affix a postage stamp in the middle box, but only to indicate or supplement the price of the IRC.

The center box is intended to show the price paid for the IRC and is marked "Prix de vente (indication facultative)." This means: "Selling price (optional information)." The post office may fix a postage stamp in this box, but only to indicate or supplement the price of the IRC (Fig. 7) — not a date stamp such as would be used in

the left-hand box. The price of IRCs in the USA recently rocketed from \$1.05 each to \$1.75, and the U.S. postal authorities are using up their old stock by fixing additional stamps to make up the value. In many countries this value is already preprinted, usually in red; in others, it is left blank. Either is acceptable.



Fig. 8. This IRC is potentially worthless as it bears no hand stamp from the issuing office.

Unfortunately, many of the post office employees in many countries do not understand the rules and stamp the wrong box by mistake, fail to stamp any box at all, or refuse to exchange IRCs (whether or not they are correctly stamped) for postage stamps. The official policy of the UPU is that "if the IRC is incorrectly stamped, the

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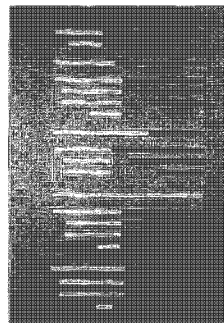
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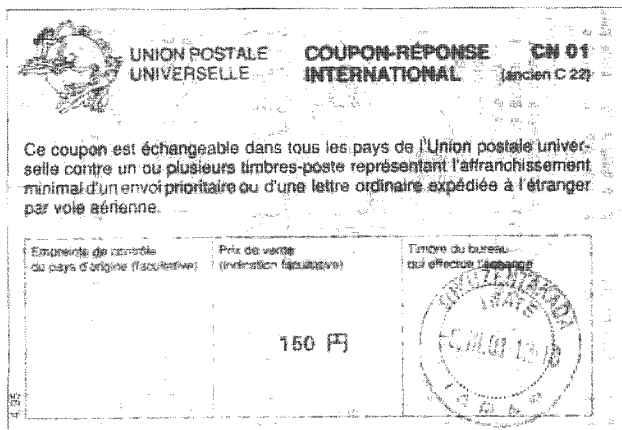


Fig. 9. This IRC is potentially worthless as it has been stamped in the right-hand box.

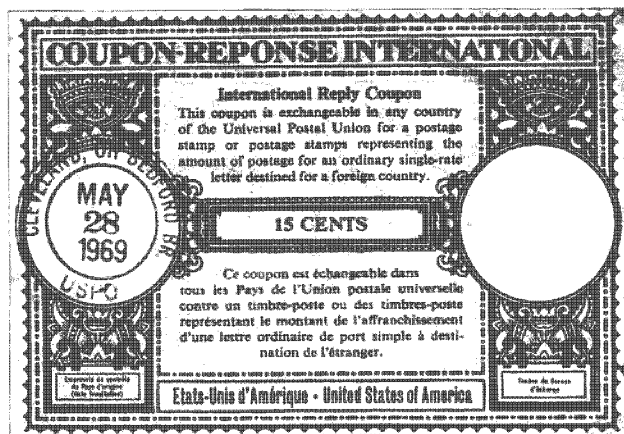


Fig. 10. An IRC originally issued in Cleveland, Ohio, in 1969 which was sent to me in 1998 for a 9MØC QSL.

validity or otherwise of the coupon has to be examined on a case by case basis." However, it is fair to say that unstamped or incorrectly stamped IRCs are generally worthless and, under normal circumstances, cannot be exchanged for postage stamps. Local and unofficial exceptions to the rules do exist, but do not expect to receive a direct reply if you use worthless IRCs. Examples of potentially worthless IRCs are shown in Figs. 8 and 9.

Some administrations, such as in Germany, require the actual postal items to be handed over the counter at the same time as the IRCs and will not merely exchange them for loose stamps.

To account for variations in international currency exchange rates, administration costs, etc., "new" IRCs generally cost over 70% more than the

face value of postage stamps for which they can be exchanged. The actual selling price is fixed by the postal administrations concerned, but must not be less than an internationally agreed minimum value. IRCs purchased new in the US for \$1.75 can still only be exchanged for \$0.80 worth of postage stamps. Secondhand IRCs circulate widely in the US for \$1 each. Recently, I have had several American amateurs approach me to buy "secondhand" IRCs at about \$0.90 each! However, this only becomes economical when large numbers of IRCs are involved.

QSL managers will usually filter out and dispose of incorrectly stamped IRCs, but will offer for sale correctly stamped and valid "second hand" IRCs. Such "secondhand" IRCs are sometimes available from U.K.-based

IRC's originally issued in 1963 and 1969! See Figs. 10 and 11.

Some difficulties arise in deciding exactly how many IRCs to send with an application for a DX station's QSL card, as the definition of "minimum postage" varies widely between postal administrations. In the U.K., it currently means 20 grams to a European destination or 10 grams to an intercontinental destination. In the U.S., it currently means 0.5 ounces to an intercontinental destination. Other criteria apply in Germany and Japan, for example. The best approach is to include a minimum of one IRC if you require a single card from an address in the same continent, and a minimum of two IRCs if you require a single card from an address in another continent. If you make more than one QSO or require more than one card, then you should increase the number of IRCs accordingly on the basis that each additional one- or two-sided QSL will weigh approximately 5 grams and a four-sided one approximately 10 grams. If you are in any doubt, then include an additional IRC!

### Alternatives

The upshot of all this is that IRCs are not a particularly good value for the money, especially when bought over the post office counter and even on a "secondhand" basis. You cannot then rely on them being accepted for

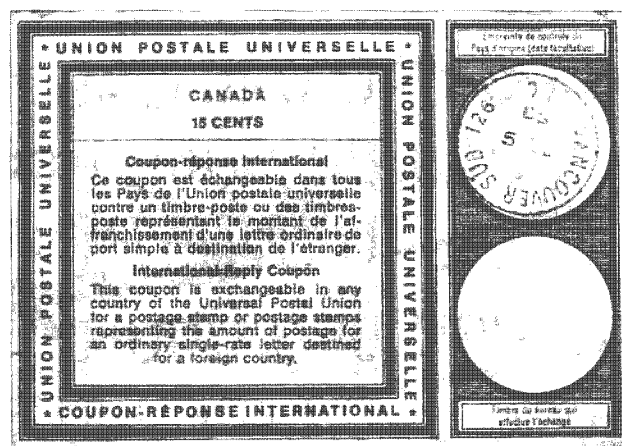


Fig. 11. An even older IRC, issued in Vancouver, Canada, in 1963, also sent to me in 1998 for a 9MØC QSL.

QSL managers at around £0.55 each. These circulate widely within the amateur radio community as "ham currency," without ever being exchanged for postage stamps, and it is not uncommon to receive IRCs with date stamps several years old. In 1998, whilst processing the 9MØC QSL cards I received some

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Read All About It!	Part 9 ... from The Hertzian Herald	K8JWR	AUG 33
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The History of Ham Radio	Part 4: The early 1920s	W9CI (SK)	MAR 53
The History of Ham Radio	Part 5: The first convention.	W9CI (SK)	APR 36
The History of Ham Radio	Part 6: Across the Atlantic	W9CI (SK)	JUN 28
The History of Ham Radio	Parts 7 & 8: Broadcast and early '20s	W9CI (SK)	JUL 50
The History of Ham Radio	Parts 9 & 10: Portable; experimenting	W9CI (SK)	AUG 50
The History of Ham Radio	Parts 11 & 12: More 1920s; The IARU	W9CI (SK)	SEP 50

#### Reviews (by manufacturer)

Hamtronics	Air Hamtronics	N6NR	MAY 44
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Idiom Press	Thumbs Up for ROTOR-EZ	K5LAD	JUL 31
Kenwood	Kenwood's Hot New TS-2000, PT. 1	N6NR	MAY 23
Kenwood	Kenwood's Hot New TS-2000, PT. 2	N6NR	JUN 13
Outreach	Up-'n'-at-'em Stealth Vertical	WB3CEH	JUN 18
Raibeam	Antennas	K7GCO	DEC 24
Small Wonder	Build the PSK-20 QRP Kit	W4DXV	SEP 18
Telex/Hy-Gain	AS-2259 man-pack antenna	VE2EQL	AUG 27
<b>Reviews (by product)</b>			
Outreach 500 antenna	Up-'n'-at-'em Stealth Vertical	WB3CEH	JUN 18
PSK-20 QRP Kit	This transceiver is a Small Wonder.	W4DXV	SEP 18
QRP Drives Ham Nuts	Mini kit reviews	NY9D	MAR 28
Raibeam antennas	RF Inferno	K7GCO	DEC 24
R-121 Aviation Receiver	Air Hamtronics	N6NR	MAY 44
ROTOR-EZ	Thumbs Up for ROTOR-EZ	K5LAD	JUL 31
TS-2000	Kenwood's Hot New TS-2000, PT. 1	N6NR	MAY 23
TS-2000	Kenwood's Hot New TS-2000, PT. 2	N6NR	JUN 13
AS-2259 man-pack antenna	Surplus Find ...	VE2EQL	AUG 27
<b>Satellite Operation, EME, Space</b>			
All Aboard for ARISS ...	Amateur Radio on the ISS	KA3HDO	NOV 40
A Modest Proposal	S-band has come of age.	G3RUH	NOV 50
AMSAT, Where to Next?	The prez tells us.	VE3FRH	NOV 58
Build the FODTrack	A low-cost tracking interface.	KA0YOS	NOV 26
Hamsats	AMSAT 2000 Space Symposium	W5ACM	JAN 43
Hamsats	Aloft at Last — AMSAT-OSCAR-40	W5ACM	FEB 43
Hamsats	AO-40 Update	W5ACM	MAR 46
Hamsats	SUNSAT Sunset	W5ACM	APR 44
Hamsats	AO-40 at Home	W5ACM	MAY 52
Hamsats	Summer and Field Day!	W5ACM	JUN 44
Hamsats	Hams in Space	W5ACM	JUL 38
Hamsats	Modes Explained	W5ACM	AUG 38
Hamsats	Field Day 2001	W5ACM	SEP 34
Hamsats	Welcome. Newcomers!	W5ACM	NOV 10
Hamsats	New hamsats in orbit	W5ACM	DEC 51
Hamsats Awards	Join the fun!	KK5DO	NOV 46
Microwave Antennas for AO-40	The expert speaks.	GM4PLM	NOV 17
Modifying the TranSystem 3733	For Mode S	KA0YOS	NOV 24
Practical RF Ground Stations	For AMSAT AO-40	GM4PLM	NOV 11
Risky Business	A way to describe designing AR sats.	K5NRK	NOV 53
The PCSat APRS Satellite	More fun on the horizon ...	WB4APR	NOV 33
What IS an EasySat, Anyway?	Now you know.	K5OE	NOV 29
<b>Software</b>			
Inside Digital TV/VCR Tuners	Part 5: Decimal-to-binary BASIC	W6WTU	JAN 14
<b>Test Equipment</b>			
\$5 Infrared Remote Tester	Test infrared transmitting devices.	WA9PYH	MAR 26
Beginner's PS Tester	Try this variable active load.	WB9YBM	DEC 40
CTCSS Encoder-Decoder Test Device	Useful piece of equipment.	W6WTU	OCT 16
<b>Tutorials</b>			
All About Class D Amplifiers	What you do know can't hurt you.	W2GOM/7	FEB 18
Bookbind THIS! — Part 1	Get organized, and save money, too.	W6WTU	MAR 31
Bookbind THIS! — Part 2	Bindings	W6WTU	APR 29
Bookbind THIS! — Part 3	Conclusion	W6WTU	MAY 32
Inside Digital TV/VCR Tuners	Part 5: Decimal-to-binary conversion	W6WTU	JAN 14
Inside Digital TV/VCR Tuners	Part 6: Making your own PC boards.	W6WTU	FEB 25
Inside Digital TV/VCR Tuners	Part 7: Conclusion	W6WTU	MAR 19
On the Go	Attention, Newcomers!	KE8YN/Ø	JUN 46
Preventive Brain Surgery for Icom Xcvrs	Protect your Icom's memory.	KI4RK	MAY 40
Return of the Wavemeter	Nostalgia? Fun project? Or both?	W6WTU	AUG 19
The Wall-Wart Bible	Troubleshooting techniques	KJ4W	AUG 14
Transistor Bias: The Secret Story	Shore up your shaky transistor theory	W2GOM/7	JAN 18
VOM Primer	Volt-Ohm-Milliammeter overview	W2GOM/7	DEC 28
Your Long-Lost Transistor Notebook	Part 1: Collecting data	W6WTU	JUL 27
Your Long-Lost Transistor Notebook	Part 2: Characteristic curves	W6WTU	AUG 24
Your Long-Lost Transistor Notebook	Part 3: Power dissipation	W6WTU	SEP 14
Your Long-Lost Transistor Notebook	Part 4: Calculating resistor values	W6WTU	OCT 21
<b>VHF/UHF</b>			
Above & Beyond	Channel Master 11.7 to 12.2 GHz LNB	WB6IGP	DEC 42



# The Peet Brothers Ultimeter 2000

*A weather station with hams in mind.*

*There is a peculiar fascination among ham radio operators for the weather. Among hobbyists, perhaps only pilots and fishermen share such a passion for knowing what the weather is doing and what that might mean for the future.*

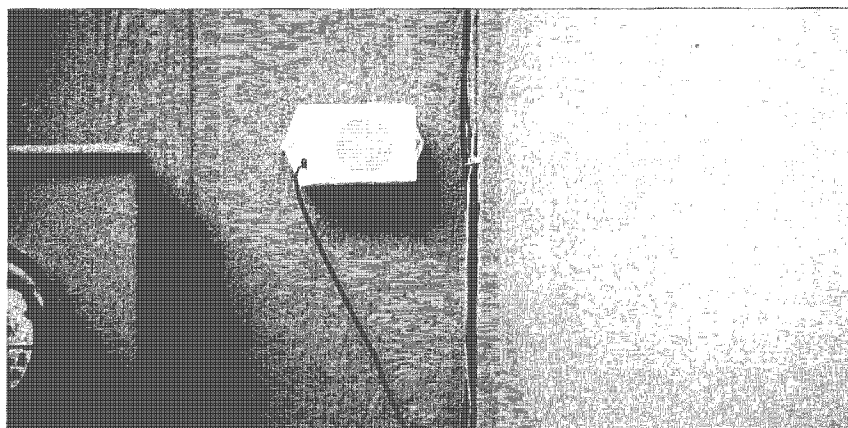
Many ham radio practices are based on the condition of the sky, the sunspot cycle, and the time of day. There are also various myths. For example, most hams believe that antennas constructed during bad weather will perform better than those erected under blue skies and sunshine. Perhaps some of it is because of the problems with QRN, the noise created on the radio caused by storms. Of course, there is nothing as impressive as watching every coax connection tossed outside on Field Day when thunder is heard in the distance.

As weather spotters for the National Weather Service, we have the perfect excuse to chase Mother Nature when she is having a bad day. Of course, SkyWarn, our weather spotting service, is an important service performed by the Amateur Radio Service, as well as one of the most exciting roles we fulfill.

I admit that I am just as much of a weather nut as the next ham, and as such there was one thing I knew I needed to add to the ham shack — a weather station. Today it is possible to connect weather-sensing devices to a computer and monitor the results on a continuing basis. As any meteorologist

will tell you, the discrete readings may be interesting, but the trend may be more helpful in determining what the weather may be in the future. Of course, the professionals have a few other tools available, such as weather satellites and Doppler radar, but you get the general idea. On the other hand, there are certain tools that have always been the mainstays for any weather station, and even without the multimillion dollar pieces, a good weather station can be designed.

The best news is that the tools needed to monitor the weather are not only easy to use and easy to interpret, but they lend themselves to interconnection via amateur radio. The most common mode for weather reporting is APRS — the Automatic Position Reporting System — which was originally developed by Bob Bruninga WB4APR. Since APRS automatically indicates the location of a given station, it already provides one of the key data points for collecting weather



*Photo A. One of the attempted locations for the temperature/humidity sensor. Warm air from the air conditioning unit required it to be moved. When the final location is determined, make sure you leave a loop of cable so that moisture can drip off the cable.*



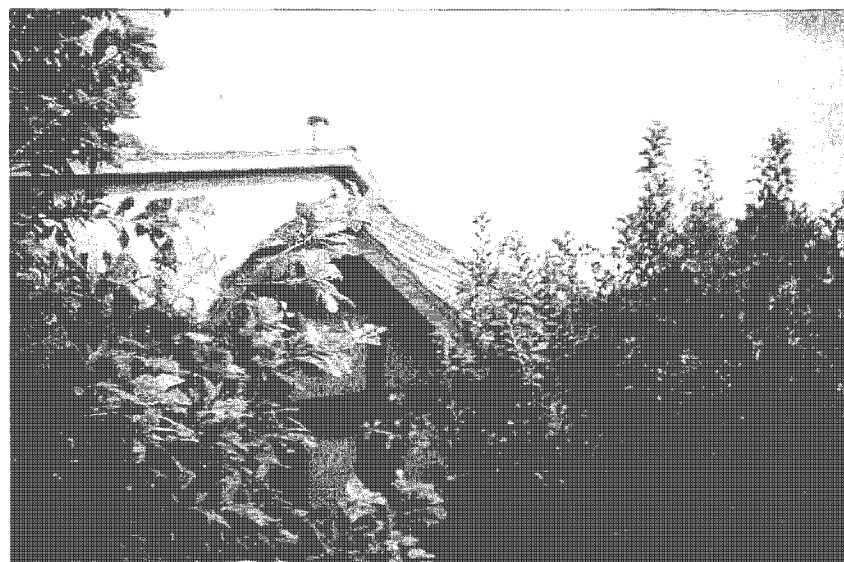


*Photo B. Wind speed and direction detector mounted on television mast to adequately clear turbulence as wind crosses the roof. Notice the balun attached to the mast at the roof top level — allows for the mast to do double duty.*

information. It is possible to use APRS to display weather information to other ham stations and via IGate stations, for this information to be available through the Internet. Because of APRS, the station location is shown on a map displayed on a computer. You can click on the station icon to access the weather information, or you can set the APRS program to display all weather data, and even limit the display to weather stations!

Many APRS programs have the ability to accept hand-entered weather data, but most of us would prefer not

to make a periodic trip to the thermometer, barometer, etc., and then enter that information into the computer. Hams are, after all, gadget nuts, and there are appropriate technological tools to perform these services for us. Although there are a number of manufacturers, I had heard a number of positive attributes about Peet Brothers and decided to see if their weather station could meet my needs. The Peet Brothers Ultimeter® 2000 appeared to meet virtually every requirement I might have for the home weather station. It is a modular system



*Photo C. From the front of the house, the wind vane is visible, but not intrusive.*

that is easy to assemble, easy to use, and extremely easy to interface with an APRS station.

The U-2000 is composed of a junction box, a display unit, and an impressive selection of sensors. The junction box is a type of a hub that provides a unit into which the other units are connected. It is also where the power supply is connected, and lends itself to being located in an out-of-the-way location. This means that the usual clutter of wires we find with computers and radios does not need to be right in the middle of the ham shack. It can be wall-mounted, although I elected to place mine above the ceiling tiles of the drop ceiling in the ham shack. Only two cables might need to be located in a visible area: the power supply with its "wall wart"-type transformer, and the cable that connects to the display unit. If properly installed and carefully located, this is a device that even the XYL could tolerate or even enjoy.

When I first received my unit, I pawed through the box like a seven-year-old at Christmas. The configuration I received included quite an array of components. There were the basic units plus a temperature sensor, a combination temperature and humidity detector, a wind gauge and a rain gauge. I examined each item. Then, holding my heartfelt desires in check, I pulled out the instruction manual. I have to admit that this is one of the easiest-to-read manuals I've ever had the pleasure to use. It is well written in real English and is geared toward the person who just got a weather station, not toward other engineers. At 47 pages, it manages to provide all the relevant information without a lot of extraneous trivia. There is even a "Quick Start Guide for those who don't have time to read instructions (and those who do)." This is enough to get things started without taking the time to read the whole manual. Or, if you do read the whole manual, you can claim that you only read the Quick Start and keep your reputation as a technological guru intact.

There is almost no assembly required for this equipment. The various units need to be interconnected, of



course, but almost everything is ready to go from the box. The wind gauge is a combination anemometer to measure wind speed and weather vane to determine wind direction. The anemometer utilizes three cups that revolve in the presence of a wind. The cups need to be installed, but that is a job that requires no tools and takes only a few minutes. There are clear directions in the manual ensuring that they are installed in the proper orientation. If you purchase the optional rain gauge, the body must be removed from the base and the base mounted on a suitable sheet of plywood, plastic, or other material. For all intents and purposes, that is the extent of the assembly. Other than that, it is an exercise in connecting cables.

Most of the cables use the same plug and jack arrangement as modular telephones. Others have a different configuration to prevent inadvertently confusing cables and connecting them where they don't belong. Probably the most important message from the manual was to connect everything together before unwinding the cables in order to test each item. They even recommend that if extension cables are going to be used, they be placed in the circuit during the testing phase.

Being an honored graduate of the School of Murphy's Law, this seemed like good advice. I ran through the tests as indicated in the manual, and each item seemed to function properly. This raised my confidence level so I felt that when I decided on a final location, this equipment would work properly.

There is a battery compartment on the back of the display unit, and I had installed the required 9-volt battery without a second thought. What I had overlooked in the manual is that the battery serves the same function as the battery in the average alarm clock. It provides a backup but is not intended to operate the unit for any extended period of time. When I went back to the unit a few days later, I was greeted by a nonworking unit. A new battery and plugging in the power supply solved the problem. It is the little things that must be watched, and I decided that I

really needed to take a few minutes to read through the short owner's manual.

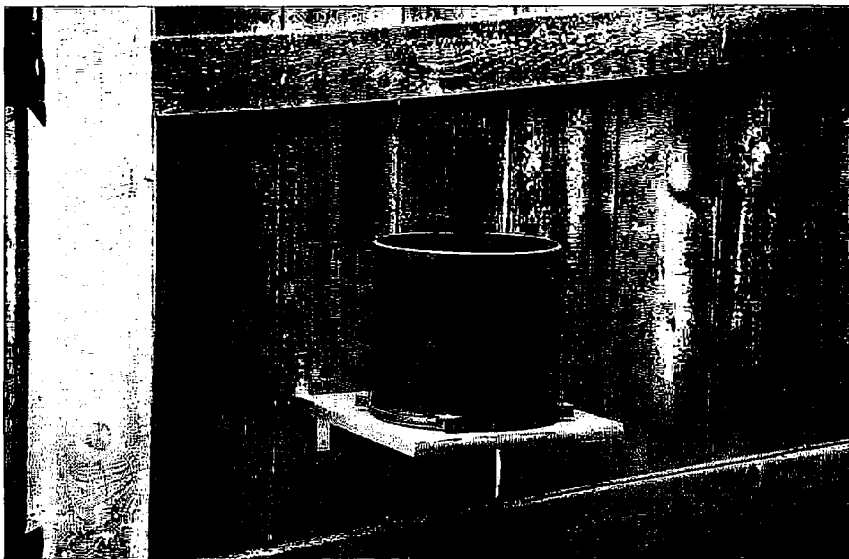
Satisfied by the manner in which everything seemed to work, and with my familiarity with the U-2000, I began to give some thought as to how I would install the various components. My neighborhood has had covenants and restrictions that have expired, but I did not want to make a highly visible statement that would offend my neighbors. On the other hand, there are certain requirements and recommendations that are clearly enumerated in the manual. I took the manual out to the back porch, and alternated between reading the manual and walking around the back yard staring at the roof. It was late on Sunday, and I knew I had at least a week until I'd have time to start the installation of the sensors. If any of my neighbors had been watching when I was grilling dinner a couple of nights later, they probably would have wondered why the roof attracted my attention as much as what was on the grill. I wanted to make sure that each sensor was mounted so as to give the most accurate reading.

My expectation as to what would be easy and what would be a challenge was not quite accurate. I expected the wind gauge to present the biggest challenge, and although there were a few issues, it went up relatively easily. On

the other hand, the temperature sensor seemed to present no visible challenges, but did provide a few interesting twists and turns.

I decided that the easiest part to install would be the temperature sensor. Actually, there are two choices: a discrete temperature sensor and a combination temperature and humidity sensor. I highly recommend the combination unit, because humidity is a very useful weather indicator and both are extremely easy to install. The temperature indicator is a small cylindrical probe that requires only one screw. The combination unit is a small box mounted with two screws onto standoffs to a wall or other flat surface so that air can flow all around the unit. It must be located so that it is not exposed to direct sunlight and somewhat protected from rain and snow. One recommended location is at the top of a wall under an eave, which was the first location I tried. Installation was relatively quick and painless. At least four feet of the cable needs to be outside to ensure accurate readings. Finally, add a drip loop, a section of the cable that droops below the sensor so that moisture can drip from the low point without getting into the sensor. I carefully dressed the cable by attaching it to the wall with cable clamps, and

*Continued on page 38*



*Photo D. Rain detector mounted on back of privacy fence. It would be better in the open, but this keeps it a little more secure from my playful three-year-old son.*





*Photo E. The "brains" of the Peet Brothers Ultimeter 2000, showing display of the data and the control panel. The unit is connected to the computer below and from there to the TNC and 2-meter rig for APRS operation.*

## The Peet Brothers Ultimeter 2000

*continued from page 37*

moved on to my next task. Unfortunately, I hadn't completely thought through my sensor location.

Under an eave may be a good location, but where I had installed the sensor was at a junction of a wall and a short outcropping that met at a 90-degree angle. This allowed air to stagnate in the location. Even worse was the fact that the location was in the flow pattern of the air conditioner compressor. As summer temperatures rose, the sensor began to read about ten degrees too high because of the hot air from the air conditioner. I had to move it twice before I was satisfied with the results. My advice? When locating the temperature and humidity detector, install it but leave the cables loose. The owners' manual calls for at least four feet of cable to be located outside, so plan on at least that much. Give the unit about a week so that you can compare your temperatures with the weather bureau and other weather stations. If you're within a few degrees, then you probably have it located properly. Once you're confident in your location, then dress the cables accordingly.

Lessons learned from the temperature and humidity sensor? Keep the

unit out of direct sunlight, allow for adequate airflow around the unit, and keep it out of unusual air flows. These include pockets of trapped air, or air discharged from a heating or cooling unit.

My next step was the wind gauge. This looks a lot more impressive than it really is, but careful thought is appropriate. The wind gauge needs to be mounted high enough so that it is reading direct wind, not wind that has changed course over a rooftop or other obstruction. This is generally going to require that the wind gauge be mounted at least five feet above the roof. Don't expect to use the chimney as a mount, because the fumes produced in a furnace or fireplace during combustion are highly corrosive and will have a negative impact on your wind gauge. Heavy walled pipes, soil stacks, etc., are also not recommended because the wind gauge works by magnetic action and thick ferrous materials can have a significant impact. PVC or other plastic pipe is too flexible, and any sway can cause reading errors. The mounting material of choice is antenna mast such as would be used for a lightweight beam or TV antenna (remember those?).

I expected to use one ten-foot section of TV mast located at the peak of my roof to get the wind sensor well

above the roof. Unfortunately, there was not enough wood on the fascia at the peak to mount the standoff hardware. After a lot of head scratching, I moved the location to the back of the house, where there was enough material to hold my lag bolts. It looked like it was adequately above the roof line, although I confess I did not crawl around the roof with a tape measure.

Naturally, the distance from the wind gauge to the junction box was about 15 feet longer than the included cable. This is a relatively easy problem to solve, but it must be approached with care and thought. As I mentioned earlier, many of the cables use modular plugs identical to those used in telephones. Extension cables are available from Peet Brothers, or you can use telephone cables. If you use off-the-shelf telephone cables, it is important to make sure they have four conductors and not merely two, as is the case in some "bargain" cables. I decided that I would make my own cables using a heavier-duty cable and attaching the modular plugs with a plug-crimping tool. This seemed to go well, although double-checking the orientation and conductivity is critical. I used (what I believed was) a high-quality connector between the wind gauge cable and my extension. I then wrapped the connection with the popular nonhardening black putty-like coax seal. I do not recommend this, since I began to have erroneous readings within a week. Turns out that the coax seal got soft enough in the summer sun to ooze into the connector and cover some of the connecting points. After cleaning up the connectors, I wrapped the connecting block with electrical tape and then added the coax seal over top of the tape. This seemed to work much better.

My readings still were somewhat suspect, though. They appeared to read correctly from some directions but not from others. This seemed to indicate that the wind gauge was mounted too low and I was getting some turbulence from the roof. Time for one more trip to the roof to add a second ten-foot section of antenna mast. This seemed to do the trick.



## Companionship

The ideal companion for the Peet Brothers Ultimeter 2000 is WinAPRS. The latest version at the time of this writing is 2.5.1, which interfaces well to the weather station. Keith and Mark Sproul have been doing a fantastic job of keeping this software up to date. Some of the latest features I like include the ability to interface to a download of the FCC database so that clicking on a station icon can be used to identify the ham by name and address. Kind of nice when tracking mobile stations or for determining details about weather reporting stations.

You can set the parameters that you want displayed for other weather stations, and with one button click into weather mode. By doing this, only weather stations and their data is displayed. It is also possible to display zones under weather advisories with a single button. This shows areas experiencing watches and warnings.

The latest downloads are available at [<http://www.tapr.org>], or [<http://www.aprs.rutgers.edu>].

Lessons learned from the wind gauge? When in doubt, put the unit a little higher. Make sure that if you use an extension to the cable it is robust, has all the right wires and connectors, and is well protected from all the elements, not just moisture. One other thing to mention is that the wind gauge must be properly oriented to the north. The mount is marked on the gauge itself, but this is not visible from ten or twenty feet below. Once you mount the wind gauge on the mast, mark the "North" at the bottom of the mast to make your life easier.

The last piece to add outside the house was the rain gauge. This looks like a small bucket with a wire running from the bottom. As I mentioned earlier, it will need to be attached to a base of some type. I chose inch plywood. When you take the rain gauge apart to mount the base, you'll see how the mechanism works. The bucket is really a

large funnel that feeds into a "see-saw arrangement" spoon that allows the rain to be measured in increments of 0.01 inch. The rain gauge must be mounted level, and ideally it will be located well out in the open. Rain, as we all know, rarely falls straight down. I did not have a truly open location, and out of deference to the neighborhood, I mounted it on the back of the privacy fence. Not ideal, but it is in a location where my three-year-old son cannot reach it and (hopefully) will not use it as a basketball goal. I would mount it on the roof, but am concerned that if it got clogged with leaves or became the site for a nest, I might not be aware of that. I mounted the plywood base to the fence with galvanized "L" brackets.

Lessons learned from the rain gauge. Either this was getting easier, or I was getting smarter.

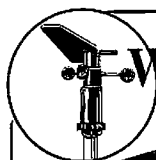
The barometer was the easiest of all. A sensor within the display unit itself measures the barometric pressure. There is no installation requirement, but it is necessary to calibrate it to the

correct barometric pressure. Barometric pressure varies with altitude, so this needs to be calibrated to the local weather station. I tuned the two-meter scanner to the local NOAA weather station and waited for the barometric pressure to be announced. It seems that NOAA announces barometric pressure in inches of mercury and APRS in my area uses millimeters. Fortunately, the Peet Brothers U-2000 can be set to the commonly used measurements, so I calibrated the unit to the weather bureau in inches, then switched it to read in millimeters.

I carefully routed all the wires, including the power supply, to the junction box. I mounted the display unit on the desk stand supplied with the kit and placed it on top of my APRS computer. I now had a working weather station.

The LCD display requires a few key pieces of data to be entered in order to provide accurate information. This

*Continued on page 57*



Actual size: 6 1/2" x 2 1/4" x 1 1/4"

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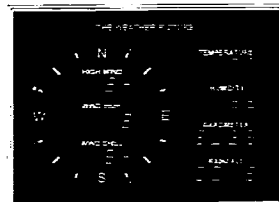
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\*Even *WeatherWatch* magazine concludes "the best we have seen."

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## Me 'n' M.E.

*This month, you are among the first to know I have finally succumbed to the lure of modern-day technology. I am writing this January column on the new whiz-bang 1.2 GHz wonder-machine.*

It took a long time to convince me of the necessity. No, it is not a Christmas present, though the XYL said it was, even if the purchase was in August. I think the push came as she saw how much ham software was accumulating on the hard drive of "her" last year's Christmas present. I had found plenty of software to fit the needs of the speed-challenged ham computer user, but I kept looking at the new stuff you guys were interested in and much of this was faring poorly on the old 120 MHz machine.

The new machine showed me some features I had never before experienced on certain software. That is fun and I will tell you about them as I explore.

The transition did not occur as smoothly as one would hope. The fancy new hardware only comes with the Millennium Edition (M.E.) operating system installed. Seems as though a Windows™ operating system should act about like previous systems and the last one of those I had take a divv on me was Windows 3.1.

Surprise! It took about a week and M.E. crashed, as in "deader than a doornail." Previous phone calls to the Help line of the manufacturer had led me to believe I should explore restoration myself. I dug out the disk marked M.E. restoration and hunted for documentation. Instructions appeared to dwindle after the "insert disk" portion.

I persisted. It was not exactly a walk in the park, but by crawling inside the head of the designer of the disk, it came off pretty well. I found it was possible to restore the entire operating system and that, other than two ham programs, all were intact and ready to use following the learning experience. Pretty slick. Estimated recovery operation time — two hours.

As I didn't understand everything I saw when I was through with the major part of the recovery, I called the manufacturer Help line again. It is good to keep them apprised

of your activities. They are often curious what people actually do with their equipment, and our ham applications mostly threaten their sense of control. I wonder if a ham ever answers a nonham computer component Help line. It would be nice to be on the same page with someone just once.

Suspensions confirmed! I was dealing with a group who were nearly as much in the dark as I was. When I told them what I was doing, their response was an incredulous, "You ran the recovery disk and got it going all by yourself?" I got the feeling they were having trouble leading folks through this exercise over the phone. Just a surmise on my part, mind you, but the confidence level diminished after that conversation.

Anyway, it appeared I was headed for a long battle with a lemon computer. But ... strangely, that seems to be in the past. Maybe M.E. just had to become accustomed to Nevada air, but it is working superbly and getting better by the day. 'Nuff said on the woes of new computer buying. I don't know where a person should purchase a new computer. I think the sales programs are a bit overkill, and the promised service is something you have to force the issue on, regardless of the vendor. I will refrain from mentioning the name of this one.

I did purchase a 19-inch monitor. This is the really necessary new feature, almost as much so as the faster CPU. I have not explored all the ham programs as yet, but I am finding much greater operating convenience with this added space. Of course, it occupies a much larger footprint than the teensy 15" monitor. I see that can be alleviated with just another measly \$1k or so for a flat monitor, but there is a budget. I also looked at a 22" monitor, but those folks were still a bit too proud of that size for me to even consider it.

One of the remarkable things about the M.E. operating system is most of my previous

software works just as well as it did on Win95 and 98. Not all, but as an instance, I happen to like this old version of Microsoft™ Word which was written originally for Windows 3.1 and it is running just fine on this system as well as it did on 95 and 98. I see no advantage, for my purposes, to upgrade to anything else. Plus, I don't like the idea of having to run an Internet browser to make a word processor function. No one has adequately defended that nonsense to me as yet.

(Since I made the last statement, I found the spell check module got lost on installation. Tried a quick fix. Maybe there is none. Had to do the check on another computer. Darn, don't quite have that homey feeling yet.)

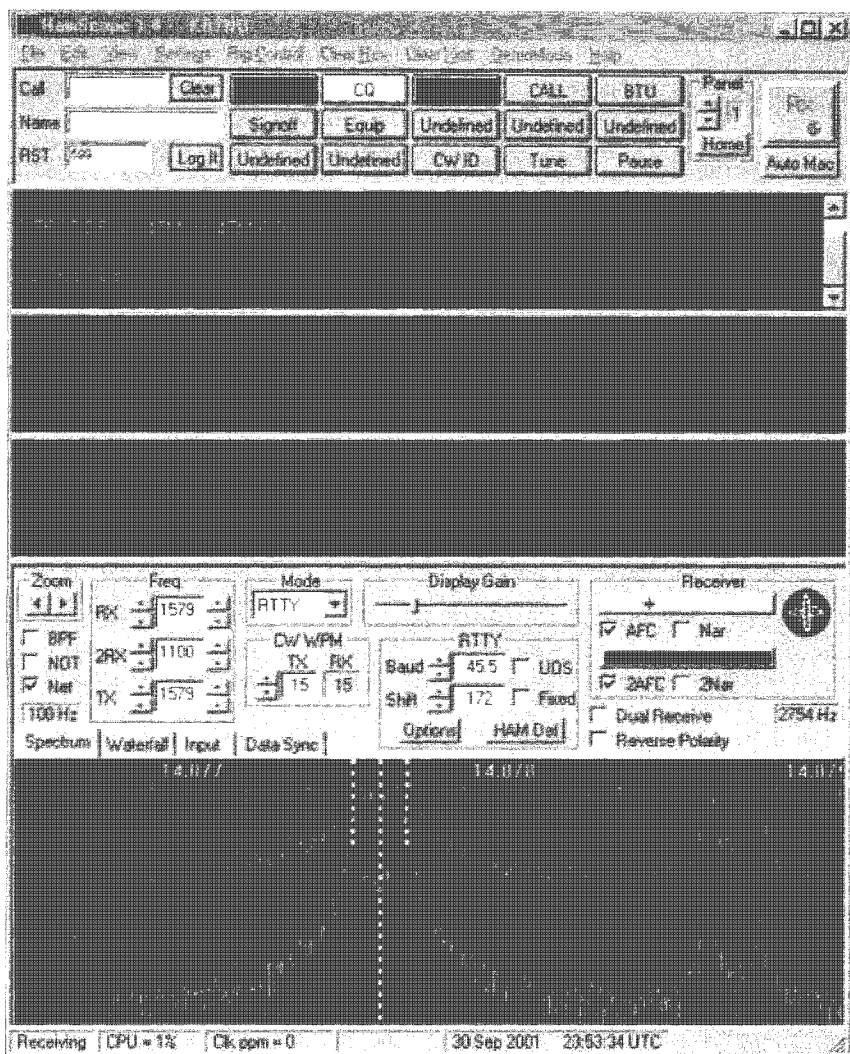
As I mentioned, I have not had a chance to install and run all the ham software available as yet. MixW 2 works great, and it is one where some of the features are finally coming to life with the new speed. It was working adequately for casual communications at 120 MHz, but now it does all the basic stuff and, bit by bit, I am finding things such as the connection to the Webcluster works where it never did before.

### More freebies for you

WinWarbler and the other DXLab freeware works just fine as far as I have gone with them at this writing. There are more new and wondrous works on the DXLab site. I see rig control has expanded to Kenwood and Yaesu. That should bring a whole new group of followers to some very nice software.

Plus, I see the new release of WinWarbler 2.0.0 in the past few days has added new modes. Well, at this writing, it appears RTTY has arrived in the soundcard mode using the MMTTY Engine. But — there is a Big Plus which I will have to defer experimenting with for a week or so.





**Fig. 1.** HamScope 1.4 screenshot — This is a somewhat skewed shot (see text) of the HamScope format using the spectrum display instead of the waterfall. This is a very nice spectrum display with the sensitivity adjustable from the “front” of the screen. The waterfall option is very good also. Easily tuned with either option. The two top panes are for receive, and in PSK31, you can easily track two signals at a time. The third pane is the compose area where you type ahead while the other station is transmitting. This was displayed on the 19-inch monitor. This and the rig control screenshot were on the monitor at the same time. The image was cropped and became two images in order to fit the page and retain the sought-after resolution. This is a slick little package of freeware in use by a lot of satisfied hams.

It will also control the PK-232MBX or the KAM controller. I am led to understand that this allows full control of these controllers by using DOS commands. Script files are in evidence to make this all come together. This means you can work RTTY, Pactor, CW, or whatever mode your controller provides. Sounds intriguing. Maybe a better phrase would include amazing. Consider the cost of the update — free!

Another popular piece of software doesn't seem to want to cooperate and that is Zakanaka. I think the Zakanaka program did not install, and then as I looked at the

instructions I found the Logger software and the Zakanaka run primarily on 95 and 98, so if you are using these packages, M.E. is not for that combo.

I installed the last full version of Logger and it functions except it does not talk to the rig. This is not a big problem if all I want to do is log QSOs manually. There are alternatives to Logger, but it was always a faithful program in earlier operating systems.

### A lesson in graphics

You may have noticed some poor quality

in the screenshots I supply to 73 in the past few months. They called several times and I was at a loss to fix the resolution of the images for them. It was finally made clear to me that they needed more pixels per inch.

It was a struggle and I thought I found the answer. After shuffling through the graphics program controls (plus the Help file), I found a pixel “adjustment” box. The first experiment yielded a high resolution image that would have been fine except it was about 10 megabytes in size. Makes a problem with transport by any method. So I continued and made a discovery to store in the back of your mind.

After a lot of compromises, I think I have a combo that will be acceptable. The old images looked and printed just fine here, but after they were saved and put on a disk the results were pretty lackluster.

What I found was that the graphics program I am using, Paint Shop Pro 6, resizes images, stores them in various popular formats, and allows more editing than I can become proficient in; but seems to not resize smaller and retain definition. I discovered the ideal resolution is available when the image is the same dimension as the original.

So, for this month's images, I skewed the dimensions of the HamScope panel to come as close as possible to a “fit” on the magazine page. I was using a 12-inch ruler on the monitor as I did so. I copied the screen to the clipboard (with the “Print Screen”) and pasted it to the graphics program. It retained its dimension as well as its sharpness. Therefore, I believe you will see a definite improvement in this month's screenshots.

Thought this might be something for those who seek the best definition for computer images, especially those who dabble with SSTV. Although I doubt the SSTV-transmitted images would benefit, it is possible you may find some value with other uses for your digital camera output.

### Yet another homebrew interface approach

I had an enlightening chat with a ham on PSK the other evening. He was doing a first-of-its-kind lash-up as far as I can imagine. If I understood correctly, he was running the output sound of his computer program to the speaker and picking it up with a boom mike to feed it into his rig.

Believe it or not, his signal was fairly clean, even had a decent IMD reading, and was printing well on the monitor. I am not sure what he was using to key the rig. The



turnovers were not immediate, but he was communicating first rate once he got all the switches and, I think, he said he had a towel wrapped around the mic-speaker setup. Perhaps the turnover time included towel placement.

I have to give credit where credit is due. This ham figured out a method to do something just a little bit innovative and stuck with it until he made it work. I admire that, even if you took what I said to mean I was making fun. I wasn't. This is part of what ham radio is about, experimenting.

Most of what we do here is experimenting, even when it is with a known product. Consider this month's go-around with the new computer. The only afterthought on that area is something that goes unexplained. The computer would crash in its automatic "sleep" mode (when it gets all quiet and the monitor goes dark). Since disabling that feature, there have been no crashes or other visible problems with the computer. I think that tells a story but lacks proof. Something to keep in the back of the mind.

## Latest on HamScope

Back to the program I chose for this month, HamScope by Glen KD5HIO. This is a highly refined update of the software package in its original form. I wrote about this program in the April 2001 column. I believe that was version 1.21. The latest is version 1.4, and the screen layout has changed, with many added features along with some bug removal.

Now there are the dual-receive panes, allowing two signals to be tracked simultaneously, and there are quite a few new buttons for your operating convenience and pleasure. One of the subtle new features is a "Log it" button. Once I had a QSO wrapped up, I clicked this button and a small window came up, giving me a choice of where to save the ADIF file the program generated.

I agreed with the program's choice and, sure enough, there is a file with all the contact information I need in the correct format to import to a regular logging program of my choice. I followed the trail and read the info just to be certain. Pretty simple.

Another great leap forward is the capability to use the MMTTY engine for RTTY. This article was written during an RTTY contest. I didn't have time to participate, but spent about 15 minutes observing the copy quality. There is a definite advantage available in RTTY reception with a soundcard and this program overlay.

What I found was that amongst the normal high activity of a RTTY contest, the massive input to a "wide-open filter" setting confuses the issue. I discovered that clicking the RTTY in the rig control panel automatically set the Icom filter at 350 Hz. Now it was necessary to reach over and turn the knob to get a signal within the passband. With the signal all alone as it entered the soundcard, the copy became nearly perfect.

I thought perhaps it was my imagination, so I clicked back to the sideband or open filter mode and the same signal was obliterated by a stronger signal a few hundred hertz away. Usually, with casual RTTY operation from this station, I do not need the narrow filter because there is such limited RTTY activity, but this was a good application of the modern, computerized, near-instant optimization. I was impressed.

## Say you saw it in 73!

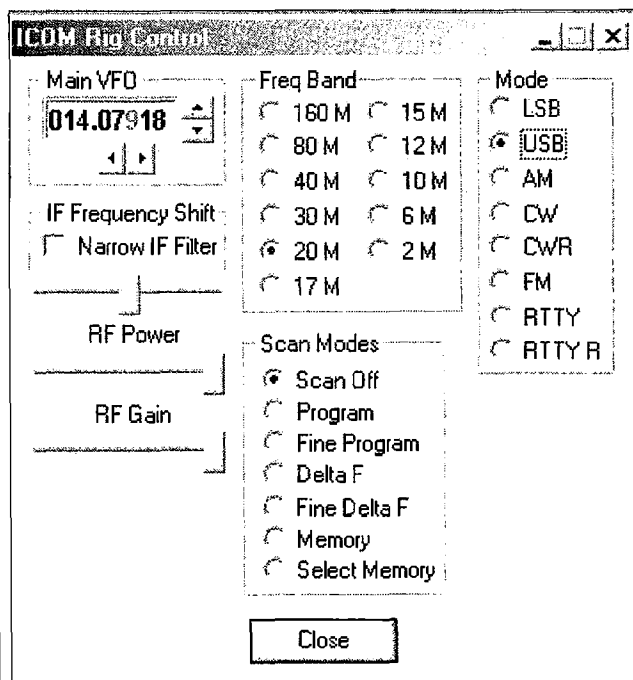
### TRANSMITTER LOCATION

New fixed site direction finders provide 2 degree accuracy, and include software for triangulation from a central control site. Mobile versions also available covering 50MHz to 1 GHz

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Tel & Fax: 44 1297 62 56 90



**Fig. 2. Rig control with HamScope** — The rig control panel is shown separately here although it was along side the panel shown in the other screenshot. Necessary footwork to get good resolution (see text). It functions very well with the Icom. It also works with Kenwood, Yaesu, and Pegasus. With the Icom, the bands, modes, and filters are available at a click. Variable adjustments include RF gain and IF frequency shift. Once you get used to using a panel like this you begin to feel stressed when you have to reach over to twist a real knob. Very convenient.



So I had to do a little experimenting. It was proved that strong RTTY can clobber another RTTY signal and we could fix that with a filter. After a bit of hunting during this busy period, I found a few PSK31 sigs on 20 and the RTTY folk were being polite and leaving a small window for "that other mode" but staying close with strong signals.

I did a little quick manual filter adjusting

to see if it improved the copy on the monitor. It appeared to help, at least at first. Then I turned off the filter and the copy continued just fine. Conclusion? It should have been a longer test, but it appears the PSK31 signal is not bothered nearly as much by the adjacent big gun as the RTTY signal. Maybe this is not a fair test, but that was the way it looked. Although I must admit, I have seen

cases of overdriven PSK signals blanking out the whole PSK notch. Just food for thought.

After all is said and done, the HamScope 1.4 works very well. You just have to try it for yourself. It does PSK31, QPSK, RTTY, CW, MFSK16, and FEC. I have conversed over the air with hams who were using HamScope in one or the other of most of these modes, and they all seem to be satisfied users.

## Something new for you on the Web

The other day, I received a pleasant surprise in the E-mail from Bob WA2HNG. Bob has assembled a very nice "Ham Radio" Web site with lots of information for the ham or those interested in the hobby. See the URL in this month's chart.

On the opening page, the list includes "73 Magazine's Infamous Chart — Internet Sources of Ham Radio Information and Programs." Click on that and there it is, ready to be used. You can simply click the links and get to the URLs instead of having to type them in, and try to avoid those errors. I am sure many of you will find this Web page quite valuable.

I haven't read through Bob's creation very thoroughly as yet. He lists what software he uses in his station. I don't think he states it is "the best," but simply that it is software that is easy to install, configure, and use. I have to agree with his approach. I like to do things that are easiest, at least at first. Then, after I get my feet wet, I like to try something with more bells and whistles. A lot of hams are in the same boat, so his suggestions make sense. Gets people going without making things hard.

I suppose I have favorites, but it is one of those things like my wife says about grandchildren. She says her favorite, "is the one she is with at the moment." I like that. No matter how I compare programs, what may seem best to me may not fit another's fancy. It is not a matter of making enemies through endorsements. If, for instance, I were to give a thumbs-down to Zakanaka because it won't run under this operating system, that would serve no purpose because I have seen that software work like gangbusters on another machine right here in this shack, and I talk to many hams who use it every day.

I guess I have to tell a story that has been in the back of my mind for a couple of years concerning Zakanaka and Logger. I complained on the reflector for those two programs that I could not get them to work together on the old computer. As some of you familiar with the author of those two

Source for:	Web address (URL):
Mix W Soundcard program for PSK31, RTTY, new modes, MTTY, FSK31, more	<a href="http://tav.kiev.ua/~nick/mixw2/www.nvbb.net/~jaffejm/mixwpage.htm">http://tav.kiev.ua/~nick/mixw2/www.nvbb.net/~jaffejm/mixwpage.htm</a>
FREE MMHam site — MMTTY — MMSSTV	<a href="http://www.geocities.com/mmhamsoft/">www.geocities.com/mmhamsoft/</a>
FREE VK7AAB — SSTV-PAL — PSK-PAL	<a href="http://users.origin.net.au/~crac/">http://users.origin.net.au/~crac/</a>
Much ham info w/SSTV downloads	<a href="http://www.conknet.com/~kb1h/index.htm">www.conknet.com/~kb1h/index.htm</a>
TrueTTY — Sound card RTTY w/ PSK31	<a href="http://www.dxsoft.com/miirty.htm">www.dxsoft.com/miirty.htm</a>
Pasokon SSTV programs & hardware	<a href="http://www.ultranet.com/~sstv/lite.html">www.ultranet.com/~sstv/lite.html</a>
PSK31 — Free — and much PSK info	<a href="http://alintel.bl.edu/es/psk31.html">http://alintel.bl.edu/es/psk31.html</a>
Interface for digital - rigs to computers	<a href="http://www.westmountainradio.com/RIGblaster.htm">www.westmountainradio.com/RIGblaster.htm</a>
Soundcard interface info — Includes Alinco	<a href="http://www.packelradio.com/psk31.htm">www.packelradio.com/psk31.htm</a>
Interface info for DIY digital hams	<a href="http://www.qsl.net/wm2u/interface.html">www.qsl.net/wm2u/interface.html</a>
WinWarbler info and DXLab Suite	<a href="http://www.qsl.net/winwarbler/">www.qsl.net/winwarbler/</a>
MFSK-related tech info — how it works	<a href="http://www.qsl.net/z1t1bpu/">www.qsl.net/z1t1bpu/</a>
Throb — New — lots of info	<a href="http://www.lsear.freemove.co.uk/www.btinternet.com/~g3vfp/">www.lsear.freemove.co.uk/www.btinternet.com/~g3vfp/</a>
Download Logger, also Zakanaka	<a href="http://www.qsl.net/kc4elo/">http://www.qsl.net/kc4elo/</a>
PSKGNR — Front end for PSK31	<a href="http://www.al-williams.com/wd5gnr/pskgnr.htm">www.al-williams.com/wd5gnr/pskgnr.htm</a>
DigiPan — PSK31 — easy to use	<a href="http://members.home.com/htelier/digipan/">http://members.home.com/htelier/digipan/</a>
TAPR — Lots of Info	<a href="http://www.tapr.org">www.tapr.org</a>
TNC to radio wiring help	<a href="http://freeweb.pdq.net/medcall/ztx/">http://freeweb.pdq.net/medcall/ztx/</a>
ChromaPIX and ChromaSound DSP software	<a href="http://www.siliconpixels.com">www.siliconpixels.com</a>
Creative Services S/W Multimode w/PSK	<a href="http://www.cssincorp.com/products.htm">http://www.cssincorp.com/products.htm</a>
Timewave DSP & AEA (prev.) products	<a href="http://www.timewave.com">www.timewave.com</a>
Auto tuner and other kits	<a href="http://www.fdgelectronics.com">www.fdgelectronics.com</a>
XPWare — TNC software with sample DL	<a href="http://www.goodnet.com/~gjohnson/">www.goodnet.com/~gjohnson/</a>
RCKRtty Windows program with free DL	<a href="http://www.rckrtty.de/">http://www.rckrtty.de/</a>
HF serial modem plans & RTTY & Pactor	<a href="http://home.att.net/~k7sz/">http://home.att.net/~k7sz/</a>
SV2AGW free Win95 programs	<a href="http://www.raag.org/index1.htm">www.raag.org/index1.htm</a>
Source for BayPac BP-2M & APRS	<a href="http://www.tigertronics.com/">www.tigertronics.com/</a>
Int'l Visual Communications Assn. — nonprofit org. dedicated to SSTV	<a href="http://www.mindspring.com/~sstv/">www.mindspring.com/~sstv/</a>
Hellschreiber & MT63 & MFSK16 (Stream)	<a href="http://iz8bty.syonline.it">http://iz8bty.syonline.it</a>
HamScope — multimode w/ MFSK16	<a href="http://users.mesatop.com/~ghansen/">http://users.mesatop.com/~ghansen/</a>
YPLog shareware log — rig control — free demo	<a href="http://www.nucleus.com/~field/">www.nucleus.com/~field/</a>
WinLink 2000 System info	<a href="http://www.winlink.org/k4cjx/">www.winlink.org/k4cjx/</a>
Airmail — free program to use WinLink 2000	<a href="http://www.airmail2000.com/">www.airmail2000.com/</a>
The Chart NOW ON THE WEB	<a href="http://www.geocities.com/normandy214/ham_radio.htm">www.geocities.com/normandy214/ham_radio.htm</a>

Table 1. The Infamous Chart — updated monthly.

Continued on page 58



## Annual Meeting

*Every year AMSAT, the Radio Amateur Satellite Corporation, holds a symposium and annual meeting. It's an opportunity to review the events of the past year, discuss current operations and plan for the future. Although the tragic events in New York and Washington, DC, on September 11th caused the cancellation of many other events around the country requiring travel, the AMSAT gathering went forward on schedule.*

**A**MSAT President Robin Haighton VE3FRH said it well in his October President's Letter. "Following the terrible incidents of September 11th, I was worried that some of you might decide to cancel your reservations, and that we would have a smaller gathering — but no! The numbers of registrants continued to rise and we had a very good turnout, comparable with other years. For me, this showed the true resolve of our members not to be intimidated, and may I thank each and every one of you who attended."

### Thursday

Satellite enthusiasts began arriving at the Holiday Inn Select in Decatur, Georgia, early on Thursday, October 4th. No presentations were scheduled, but it was a great opportunity to register, meet, and eat with other AMSAT folks, and try out W4O (Whiskey 4 OSCAR), the full-featured satellite station that the event coordinators had set up in the hospitality room.

### Friday

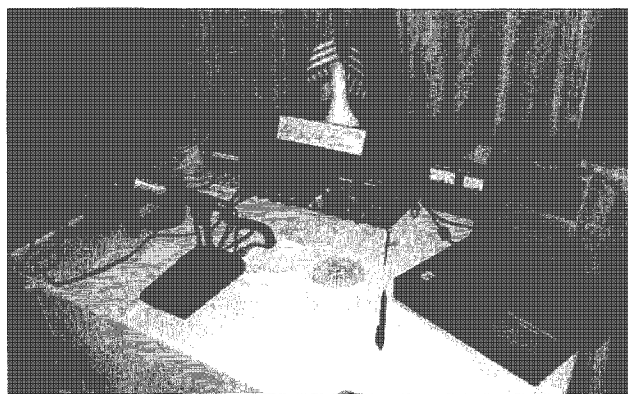
The Host Committee Chair Steve Diggs W4EPI got things started at 9 a.m. AMSAT President Robin Haighton VE3FRH followed by welcoming all of the participants and attendees. The AMSAT Symposium and Annual Meeting is not a hamfest, but is similar to a gathering of professional engineers that just happen to be hams with a passion for cutting-edge, space-based communications. A few displays were in evidence just outside the main meeting room for The SETI League (Search for Extraterrestrial Intelligence), APRS (Bob Bruninga WB4APR's Automatic Position Reporting System), Kenwood, and AMSAT. Bob K5GNA had 2.4 GHz downconverter systems and components for sale, and various dishes and helix antennas were just out for "show and tell."

The first presentation began with a live demonstration. Bob Bruninga WB4APR took the symposium outside to monitor a pass of PCSat, one of the new hamsats

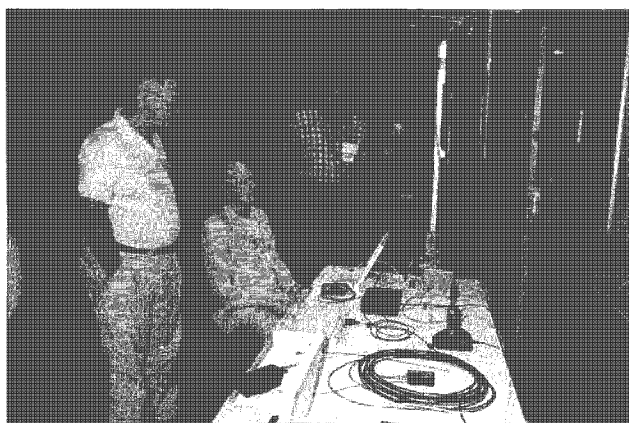
launched from Kodiak, Alaska, on September 30th. Bob easily monitored the packet data from PCSat with his Kenwood TH-D7 handie-talkie. See last month's HAMSATS and Bob's Web page [<http://web.usna.navy.mil/~bruninga/pcsat.html>] for more information about PCSat.

The rest of the morning was filled with thought-provoking and informative topics. Gould Smith WA4SXM discussed AO-40 (AMSAT OSCAR-40) telemetry from generation to interpretation. Steve Bible N7HPR provided an update on the EasyTrak Rotor controller project. Jerry Brown K5OE talked about YAHE (Yet Another Helix Experiment). His rather tongue-in-cheek description of his 2.4 GHz helical antenna experiments concluded that a helix antenna is fine as a dish feed, but not as a stand-alone antenna for AO-40 reception. It just doesn't have enough gain.

Bruce Paige kicked off the afternoon with information about the AMSAT Awards Program, and a new certificate called the



**Photo A.** Whiskey Four Oscar was available for satellite contacts by AMSAT Symposium attendees during the event in Decatur, Georgia.



**Photo B.** Bob Bruninga WB4APR demonstrates a simple computer rotor interface for PCSat tracking.



AMSAT Elmer Award that promotes contacts with new satellite operators and schools. You can find out more about the AMSAT awards in Bruce's article in the November 2001 Special Satellite Issue of 73 or via the AMSAT Web site at [<http://www.amsat.org>].

Other Friday afternoon and evening talks included Phil Karn KA9Q's description of an efficient digital mode transponder, 2001: A Moonbounce Odyssey by Paul Shuch N6TX, a Beginner's Guide to Satellite Ham Radio by Gould Smith WA4SXM, SETI@Home and AMSAT by Dr. Tom Clark W3IWI, and a forum preview of the systems proposed for the next major AMSAT satellite. The new satellite program was referred to as Project JJ, named for Dick Jansson WD4FAB and Lyle Johnson WA7GXD.

## Saturday

Activities got started early on Saturday morning. With the success of the K-band transmitter (24.048 GHz) on AO-40, many hamsat enthusiasts have set their sights on receiving the high microwave signals. A 24 GHz Working Group discussion ensued at 7:30 a.m. There are very few commercial sources for receive equipment designed to receive this ham band. The gear from DB6NT is well-designed and effective, but it is expensive. Various ideas on how to get on this band without melting down credit cards were presented in a relatively open group brainstorming session. Some of the ideas presented can be found on the Web at [<http://www.sunsun.net/ao40/>]. Other 24 GHz information can also be found at [<http://www.oh2auc.pp.fi/ja1ati.htm>].

Frank Bauer KA3HDO, AMSAT VP of Human Spaceflight Operations, updated symposium attendees on the many firsts achieved with ham radio on the International Space Station. Tony Montiero AA2TX described new features in the Instant Tune software. Joe Fitzgerald KM1P offered some thought-provoking possibilities on how to receive the LASER transmissions from AO-40 if and when they are activated. Ed Cole AL7EB described his home system for Mode S (2.4 GHz) reception from Alaska.

After a break for lunch, Jerry Brown K5OE gave a serious talk on optimizing 2.4 GHz reception using short helix antennas in conjunction with screened MDS semi-dishes. The typical 2.1 GHz terrestrial TV downconverter needs minor modifications to be useful for AO-40 reception, but Jerry provided some fixes to make them work better. The satellite signal is circularly polarized. The typical downconverter antenna is linear. By using a small helix and covering the grill work of the typical reflector with hardware cloth or screen, reception can be quickly enhanced by at least 4 dB. Jerry's paper in the *Proceedings of the AMSAT-NA 19th Space Symposium and AMSAT-NA Annual Meeting* (available from AMSAT and the ARRL for \$15.00) tells it all. You can also check out the details on his Web site at [<http://members.aol.com/k5oe/>].

Other afternoon talks and activities included United States Naval Academy Cubesat Ideas by Bob Bruninga WB4APR, Software Designed Radios by Steve Bible N7HPR, Satellite Links: Things You Should Know by Jan King W3GEY, and an AO-40 Status Discussion hosted by AO-40 designers, builders, controllers, and data collectors. It was a great day!

Due to a last-minute cancellation, Stacey Mills W4SM was given the opportunity to step forward with no notice and become the speaker for the evening banquet. He did, and it was excellent. Stacey is one of the few hams around the world who sends commands to AO-40 to set schedules, activate systems, and run experiments. It is a very involved task. He distilled the process to terms that all

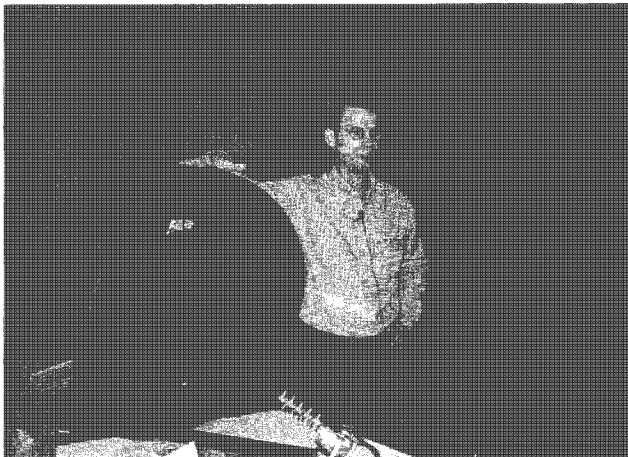
Continued on page 46



**Photo C.** Howard G6LVB brought a complete AO-40 station from "across the pond" to the AMSAT Meeting. He set up in the hotel parking lot and made contacts, lots of them.

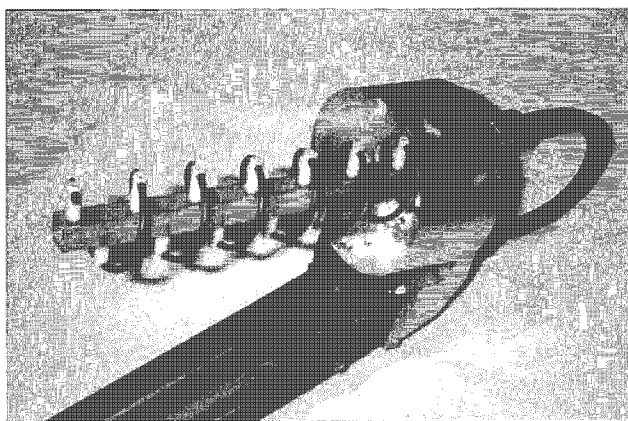


**Photo D.** A close-up of one of Howard G6LVB's 2.4 GHz downconverters positioned in front of his Umbrellantenna. What was an umbrella is now a dish antenna covered with metal fabric.



**Photo E.** Jerry Brown K5OE gave two talks concerning the use of helix antennas for 2.4 GHz satellite operation.





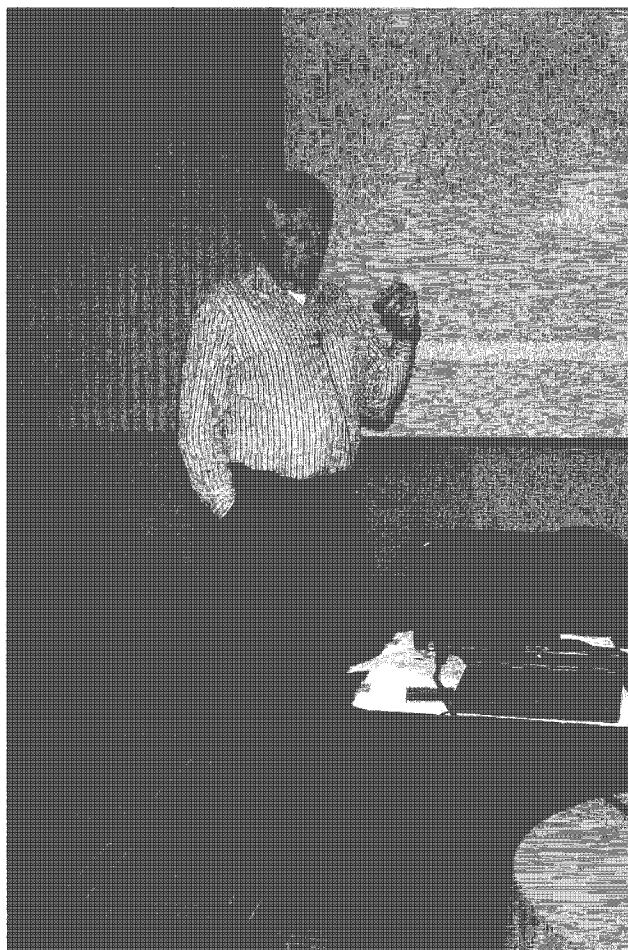
**Photo F.** Close-up view of a helix feed designed and built by Dick Jansson WD4FAB for use with shallow dish reflectors.

## HAMSATS

continued from page 45

could understand and provided some insight into the magnitude of the job.

Saturday concluded with prizes, lots of



**Photo H.** AMSAT satellite designer and builder Jan King W3GEY talked on Satellite Links: Things You Should Know (But, Were Afraid to Ask) at the 2001 AMSAT Space Symposium and Annual Meeting.

them. Ranging from coffee mugs to expensive microwave gear and radios, almost everyone got something. The Atlanta/Denver AMSAT group did a fantastic job.

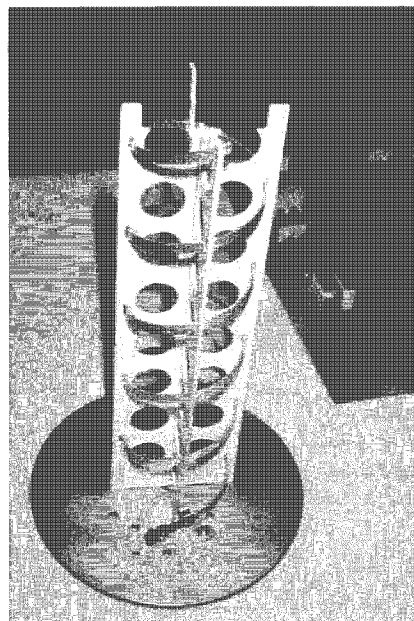
## Sunday

Once again activities got off to an early start, this time with a Field Operations Breakfast hosted by Barry Baines WD4ASW.

This was soon followed by an International Amateur Radio Union Meeting chaired by Hans Van de Groenendaal ZS6AKV. For those who could attend, the fun began at 9 a.m. with a tour of the Fernbank Science Center. For the rest, it was time for the AMSAT Board of Directors Meeting. As the AMSAT gathering was winding down around noon, the Board Meeting was just getting into full swing. With the exception of about an hour of closed-session discussion, the Board meeting was open to AMSAT members, and was quite interesting as future projects were presented, finances analyzed and problems solved. The process lasted through Monday. A complete transcript is printed in the AMSAT Journal that is sent to all AMSAT members.

## AMSAT moves on

While operations and experiments continue with AO-40, AMSAT-NA is investigating future opportunities. AO-40



**Photo G.** This is the engineering model of the helix that is currently in use on AO-40 for the S-band (2.4 GHz) downlink.

activity is directed by AMSAT-DL (Germany). The AMSAT-NA future focus is distributed among at least three possibilities, including what is now known as Project JJ, an advanced analog and digital microsat, and opportunities to build systems for inclusion on the space station and satellites built by other groups. The future promises to be exciting. 73

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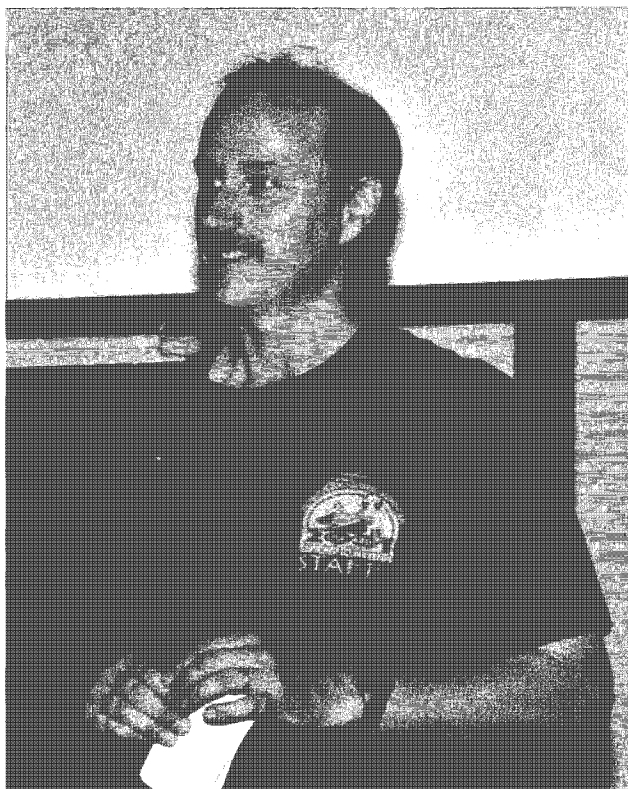
## ARDF Championships, Part 2: The World Comes to Duke City

*By any measure, the first USA ARDF Championships exceeded everyone's expectations. Radio-orientees from ten states and three other countries converged on Albuquerque, New Mexico, from July 31 through August 4 to learn new ARDF techniques, practice their skills, and compete to see who is best in the country at this new (to us) Amateur Radio sport. This month, "Homing In" concludes its coverage of this historic event.*

When our 13 colonies were united by the Declaration of Independence in 1776, Albuquerque had already been in existence for 70 years. Spanish settlers, who arrived there just after the *Mayflower* landed in the east, named the town after the Duke of Albuquerque, the viceroy of New Spain. That's why the locals call it "Duke City."

In the 21st century, this town on the Rio Grande has become a city of about 400,000. The Kodak International Balloon Festival brings in thousands of visitors every October. Finance, commerce, and military research take place all year long. So do ham radio hidden transmitter hunts, both on foot (foxhunts, radio-orienteeing, ARDF) and in vehicles (T-hunts).

The Albuquerque Amateur Radio Club (AARC) was incorporated in 1963, but there was plenty of ham activity before that, including foxhunts on 10 and 75 meters. The recent resurgence in radio direction finding (RDF) can be traced to Kevin Kelly N6QAB, who learned it in southern California and got it started in Duke City when



**Photo A.** Event Chair Jerry Boyd WB8WFK headed up the excellent team of volunteers that put on the Championships.



**Photo B.** Xu Ning sets out on two meters wearing a hydrapack on his back. It helped him next day on the 2m hunt, when he became lost.





*Photo C. Feng Chang BG1FC, China's Team Trainer, examines my foxboxes and explains their features in Chinese to the others at the practice session on campus.*

he moved there about a decade ago. I visited at that time and featured the foxhunters of Albuquerque in a "Homing In" article.<sup>1</sup> Another Albuquerque hunter, Jerry Boyd WB8WFK (**Photo A**), especially liked foxhunting on foot. Jerry traveled to Portland, Oregon, in 1999 for the first IARU

Region 2 ARDF Championships, bringing a high-performance 80-meter ARDF set of his own design.<sup>2</sup>

When the opportunity arose to host USA's first-ever national ARDF championships of radio-orienteeing, Jerry convinced his fellow club members how much fun it would



*Photo D. Adam Scammell VK3YDF (left) and Bruce Paterson VK3TJN came from Australia to Albuquerque on the first leg of their around-the-world ARDF tour.*

be. A committee was formed as club officers and others stepped forward to make it happen. Scott Stevenson KC5VVB volunteered to organize the starting line operations. Club President Mike Eaton K5MJE agreed to handle the finish line. Mike Pendley K5ATM saw to all the details of getting housing, food, and meeting rooms at the University of New Mexico campus near downtown Albuquerque. Mike's son Jon was placed in charge of the youth volunteers who provided communications on Family Radio Service frequencies at the finish line, as part of his Eagle Scout project. Brian Milesosky N5ZGT took responsibility for the awards banquet.

WB8WFK saved one of the most tedious tasks for himself — the maps. For competitive wilderness orienteeing, an ordinary USGS topographical map isn't good enough. Orienteering maps must show the thickness and runability of the entire area, as well as details such as trails, fences, and rootstock. A standard format has been published by United States Orienteering Federation. Once it's all on paper, the entire area must be thoroughly field-checked against the map for accuracy. Assisting Jerry in producing and checking the excellent 3-color maps were K5QQ, KC5KH, K5HAB, and WB5IDL from the New Mexico SAR Support Team, plus Jerry's kids, Gail, Megan, and Taylor.

As a member of an active search-and-rescue group, WB8WFK realized the potential dangers for radio-orienteeers in the mountains of New Mexico. For some competitors, this would be their first time in a full-sized venue. If they got lost, the combination of altitude and overhead sun could cause severe dehydration. Encountering a wild animal such as a bear was a distinct possibility, too.

AARC took many steps to ensure everyone's health and safety. Each person was given a hydrapack that could be strapped on to provide over a half gallon of water, ready to sip at any time through a tube and valve (**Photo B**). Water and juice were available at start and finish points, and there was a water station on each course at transmitters 3, 4, and 5. First Aid was close by at start and finish, along with an aid station in the middle of each course at a trail intersection prominently marked on competitors' maps.

Each water pack had a whistle attached. All volunteers and competitors were urged to pay attention for whistles and act immediately to summon help if one was heard.

*Continued on page 50*





**Photo E.** Volodymyr Griedov UT5UAZ is so excited after receiving his gold medal for two meters that he's upstaged AARC President Mike Eaton K5MJE in this photo. UT5UAZ also received a silver medal for the 80m hunt.



**Photo F.** Serhiy Zarubin of Ukraine won gold on 80m and silver on 2m. At the closing banquet, he took the mike to thank everyone for their hospitality.

## HOMING IN

*continued from page 48*

### China, Australia, and Ukraine

Last month's "Homing In" introduced the stateside competitors and listed all medal winners in the USA-only standings. Now let's meet the rest of the radio-athletes. It's traditional for foxhunters to visit other countries' national ARDF championships, so AARC was ready to treat them all with traditional southwestern hospitality.

The biggest group of overseas visitors came from the People's Republic of China. They were led by Han Zhaofang BG1HZE, Deputy Secretary of the Chinese Radiosports Association (CRSA), which hosted the 2000 ARDF World Championships.<sup>3</sup> Mr. Han served as translator for most of the rest of his countrymen, all of whom were adult males. Their Team Manager was Yan Chenggen, a prominent organizer of ARDF events in China.

Feng Chang BG1FC and Hou Huimin were the only other experienced radio-orienteers in the 12-member Chinese delegation (**Photo C**). Wei Deying and Yang Yongsheng represented the Provincial Radio Regulatory Bureau, China's equivalent of the FCC. Dai Jun, the youngest, is a military communications engineer. The rest are schoolmasters and education ministers who oversee student ARDF programs. For instance, Ren Dexiang has fostered ARDF training in local schools for 20 years.

After the Albuquerque events, the entire Chinese team flew to Victoria, British Columbia, where they participated in the Friendship Radiosports Games, a biennial event sponsored by the Friendship Amateur Radio Society.<sup>4</sup> There, they competed in a two-meter foxhunt against teams from USA, Japan, and Canada.



**Photo G.** Hou Huimin dashes to the two-meter finish. He didn't win a medal on that band, but next day he captured gold in the 80-meter hunt.



Medal	2m Winners	80m Winners
<b>M19, 4 foxes</b>		
Gold	Jay Thompson W6JAY	Jay Thompson W6JAY
<b>M21, 5 foxes</b>		
Gold	Volodymyr Griedov UT5UAZ	Serhiy Zarubin
Silver	Serhiy Zarubin	Volodymyr Griedov UT5UAZ
Bronze	Bruce Paterson VK3TJN	Gyuri Nagi KF6YKN
<b>M40, 4 foxes</b>		
Gold	Dale Hunt WB6BYU	Dale Hunt WB6BYU
Silver	Charles Scharlau NZØI	Scott Moore KF6IKO
Bronze	Kevin Haywood N4MGB	Charles Scharlau NZØI
<b>M50, 4 foxes</b>		
Gold	Dick Arnett WB4SUV	Hou Huimin
Silver	Larry Benko WØQE	Dick Arnett WB4SUV
Bronze	Robert Frey WA6EZV	Robert Frey WA6EZV
<b>M60, 3 foxes</b>		
Gold	Harley Leach K17XF	Harley Leach K17XF

**Table 1.** Overall standings and medal winners by category.

Representing Australia were two young men from Melbourne, Bruce Paterson VK3TJN and Adam Scammell VK3YDF (**Photo D**). The homebrew RDF gear they brought was of great interest to all "techies" among the competitors. For them, Albuquerque was just one stop on a round-the-world odyssey that included the Friendship Radiosports Games, the German National ARDF Championships in Bavaria, the IARU Region 3 Championships in Mongolia, and a tour of China.

Locality	Participants	Total Medals	Gold
Cincinnati, OH	2	8	3
Los Angeles, CA	7	7	4
Denver, CO	3	4	0
Atlanta, GA	4	3	0
Independents	7	16	10

**Table 2.** Number of participants and medals won from four USA metropolitan areas. Independents were the sole representatives of their home areas.

A six-member team from Mongolia also registered for the Championships. Because of visa and travel problems, none of them got to New Mexico in time for the foxhunts.

Albuquerque's location in southwestern USA made travel easier from Asia and the Pacific, as compared to Europe. Nevertheless, two young ARDF experts from Ukraine made their way to Duke City. Volodymyr Griedov UT5UAZ (**Photo E**) and Serhiy Zarubin (**Photo F**) now have many new stateside friends. Serhiy is still in this country teaching ARDF techniques to southern California hams as I write.

### So who won?

To no one's surprise, the two world-class Ukrainians turned in the best overall performances on both bands, finding all five foxes in less than 55 minutes each day. Serhiy completed the 80-meter hunt in less than 37 minutes! The two Australians also did very well in the same category (M21, males of any age, five foxes required). Bruce took the bronze on two meters with a time under 61 minutes and Adam placed fourth on 80m by completing the course in less than 58 minutes. For the USA, Gyuri Nagi HA3PA/KF6YKN was right behind VK3TJN on two meters. Next day, Gyuri took the M21 bronze on 80 meters by crossing the finish in under 50 minutes.

Five USA and three Chinese runners squared off in the M40 category (males ages 40-49, four foxes required). Dale Hunt WB6BYU took gold on both bands with times under 83 minutes. Charles Scharlau NZØI, in his first formal ARDF event, grabbed silver on 2m and bronze on 80m with under-2-hour times. Scott Moore KF6IKO earned silver on 80m and Kevin Haywood N4MGB got bronze on 2m. None of the Chinese medaled in this category.

It was also USA-versus-China in the M50 category (males aged 50-59, four foxes required). Hou Huimin of China went from last place in the 2m hunt to gold medal winner on 80m (**Photo G**). The other top positions in this category were a hard-fought contest between Dick Arnett WB4SUV, Bob Frey WA6EZV and Larry Benko WØQE. Dick took gold on 2m and silver on 80m. Larry was silver medalist on 2m. Bob got bronze on both bands.

**Table 1** lists all medal winners in the overall standings. Separate medals were awarded to the best stateside competitors, as listed in last month's "Homing In."

Among participants from areas of the USA that have regular ARDF practice sessions, there was lots of interest (and rivalry) to see which of these places would provide

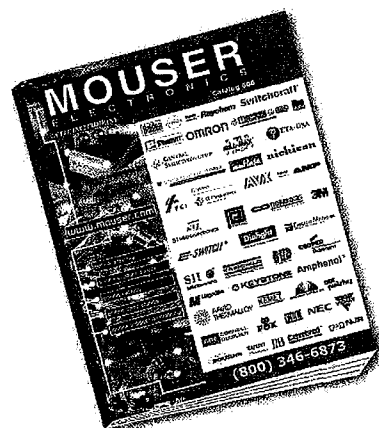
the most winners. **Table 2** gives the total medal count for stateside localities with more than one competitor in Albuquerque. It was a close race between the two participants from Cincinnati and the seven from southern California, but the seven independent USA hunters that were the sole representatives of their localities or were from places without ARDF programs did best of all.

### Can this be topped?

A hearty "Well done!" and thank-you to AARC and its event leaders, as named above. Thanks to ARRL President Jim Haynie W5JBP and Southwestern Division Vice-Director Art Goddard W6XD for attending and supporting. Thanks to the organizational and corporate sponsors who donated everything from busses to raffle prizes. And thanks to everyone who attended for their interest, enthusiasm, and positive attitude.

For the exact times and standings of every competitor, plus more photos, warm up your Web browser. Start with the "Homing In" site (URL at top) for a summary and over a hundred photos. Almost everyone

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**Photo H.** Dale Hunt WB6BYU rushes out of the starting corridor in the 2m hunt. In October, Dale became IARU's ARDF Coordinator for Region 2.

Many foxhunters have raised concerns about the time and expense of attending both the USA Championships and the World Championships in the same year, so the USA National will be a relatively inexpensive weekend event. It will get under way on Friday afternoon with a practice event, followed on Saturday by the main two-meter hunt and on Sunday by the 80-meter hunt. In addition to the hunts, there will be a cookout on Friday evening, a dinner on Saturday night, and an award ceremony following the 80m hunt, all included in the registration fee. Lodging options include cabins in the park and campgrounds with RV hookups. There are

foxhunting by passing a resolution at the Board of Directors meeting. It authorized the appointment of a volunteer USA ARDF Coordinator to promote radio-orienteeing within the USA and to oversee ARDF activities such as the USA ARDF Championships. I accepted the appointment to that post. Then in June 1999, I received a similar appointment by the International Amateur Radio Union (IARU) as volunteer ARDF Coordinator for all of North, Central, and South America (IARU Region 2).

That's too much work for one person to do well, so I have been seeking someone else to take on the international responsibilities. At last, I'm pleased to announce that the new IARU Region 2 ARDF Coordinator is Dale Hunt WB6BYU of Yamhill, Oregon (**Photo H**). His appointment was made last spring by outgoing IARU R2 President Tom Atkins VE3CDM and was approved by IARU at its Region 2 general meeting in Guatemala City last October.

WB6BYU has been active in transmitter hunting for many years, competing on foot formally for the first time at the 1997 Friendship Radiosports Games near Tokyo. He led Team USA at the 1998 ARDF World Championships in Hungary and was the first person from Region 2 to serve on the International Jury at the 2000 ARDF World Championships in China. In 1999, he was the prime mover behind the first IARU R2 ARDF Championships in Portland, Oregon, sponsored by the Friendship Amateur Radio Society.<sup>5</sup>

I am continuing as USA's ARDF Coordinator, to develop radio-orienteeing further in the States. My current responsibilities include planning national ARDF Championships for 2002 and 2003, as well as organizing Team USA for the 2002 ARDF World Championships in Slovakia. I will work closely with WB6BYU in making arrangements for the next IARU Region 2 ARDF Championships.

WB6BYU will represent the Western Hemisphere at meetings of IARU ARDF officials worldwide. Equally important will be his mission to bring the sport to more of the 39 countries whose national Amateur Radio societies belong to IARU Region 2. Of them, only USA and Canada have their own national ARDF Coordinators, so Dale's plate will be very full. You can help by talking up ARDF in your QSOs on the DX bands, especially with stations in Central and South America.

Dale and I welcome your ideas for bringing ARDF to more hams throughout the USA and the Americas. Write to me at the

who attended is pictured at least once. There's also a link to AARC's 2001 ARDF Championships Web site, which has photos by NSZGT and W6XD, plus PDF files with all the official results.

If you missed all the fun in Albuquerque, you'll have another opportunity to compete against USA's best in just a few months. Georgia Orienteering Club (GAOC) has been selected to host the next USA ARDF Championships in the spring of 2002.

National ARDF championships are normally held in late summer or early fall. However, the 2002 ARDF World Championships will take place in Slovakia in early September. To permit plenty of time for selection of Team USA and overseas travel planning, the 2002 USA Championships are being moved to spring.

The Second USA ARDF/Radio-Orienteeing Championships will be April 19–21, 2002, at F.D. Roosevelt State Park near Pine Mountain, Georgia, approximately 90 minutes southwest of Atlanta. Standard international rules will be used for these foxhunts, which are all on foot in beautiful woods near Callaway Gardens.

also many local motels and bed-and-breakfast inns.

USA ARDF Championships are open to anyone, beginner or expert. Competitors in Georgia will be placed in the same age/gender categories as in Albuquerque, with awards for winners in each category. Laurie Searle KG4FDM of GAOC will be the Meet Director. Sam Smith N4MAP will set the ARDF courses. Offers for positions on Team USA for the 2002 World Championships will be based on several factors, including individual performances in Atlanta and Albuquerque.

For more details and registration information, see the 2002 USA ARDF Championships Web site, which you can reach in just a couple of clicks from the "Homing In" Web site. If you're not on the Web, send a self-addressed stamped envelope to me and I'll reply with paper copies.

### **New coordinator for all the Americas**

In early 1998, American Radio Relay League's leaders recognized the growing interest in international style on-foot

*Continued on page 58*



# Power for Emergency Operations

*When it comes to emergency communications, there is no doubt that the most difficult issue to manage is power. Your radio and your antenna will probably not undergo any fundamental changes, but the usual source of electricity to power your radio may no longer be available.*

Let's face it, we tend to take the 117-volt AC power that is in our homes for granted, but virtually any emergency can take the AC power off-line. Storms, earthquakes, and industrial accidents have always been a factor, but in this day and age we can no longer rule out intentional disruptions such as terrorist acts. Every ham who expects to provide communications in an emergency should have a reliable backup power source. The ideal backup or emergency power source should be reliable, of course, but it should be as close to invisible as possible. In other words, an ideal source would require little or no maintenance, be self-regulating, and would be instantly available when needed.

Some sources, such as generators, can produce a reasonable amount of power, but they do require a high degree of maintenance. They must be kept fueled. If they are not used on a regular basis, the fuel needs to have certain additives mixed in to provide for easy starting. Often they must be moved from their storage location to an

operating position and then connected to the equipment before they can be used. They have their advantages, but maybe there are better options.

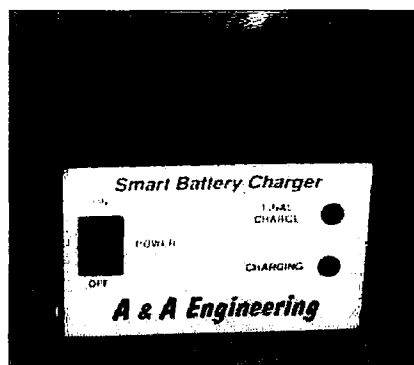
Batteries are an option, of course, especially since so much ham equipment can be run at voltages around 12 volts. Unfortunately, the chore of keeping batteries charged and switching over to the batteries makes them inconvenient. Automobile batteries provide a high level of current but not a long life. Traditional lead-acid batteries, whether automotive or "deep cycle," produce hydrogen gas, which can be explosive in an enclosed space. Gel cells provide many of the advantages of lead-acid batteries, but the acid cannot be spilled and there is less gas production. Generally, these can be used indoors with no major problems. Unfortunately, hooking a gel cell battery to the 13.8-volt power supply will probably do more to destroy the battery than to provide adequate emergency power.

What if there were a way to maintain a battery so that it was immediately available

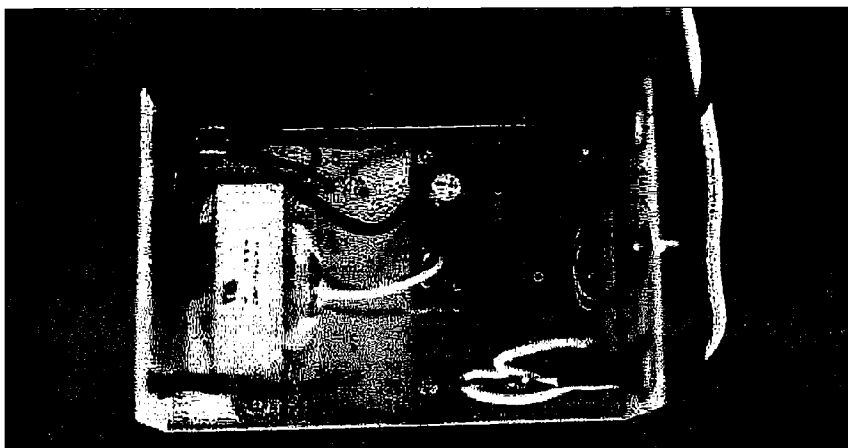
and constantly kept charged? You could hook your radio to the battery and charger. The combination would provide power from the charger for routine operations. If power were interrupted, the battery would immediately take over as the primary source. The most you might have to do is switch from high power to low power on the transmitter. That would make life much simpler. But batteries can be difficult to maintain at a peak charge without causing damage to the battery by overcharging.

Killing the battery, by definition, defeats the goal of having a ready power source available. What we need is a battery charger that is specifically designed to work with gel-cell batteries that is smart enough to know what the battery needs. It needs to sense whether the battery can be charged and what current or voltage needs to be applied to charge it. Finally, it needs to be able to determine when the battery is completely charged and terminate the charging current.

*Continued on page 58*



**Photo A.** Small, clean and uncluttered in appearance, the A & A Smart Battery Charger can save you a headache when a storm or other incident removes your main power source.



**Photo B.** The main components in the Smart Battery Charger include the transformer and the printed circuit board. Assembly is straightforward and uncluttered.



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the April issue, we should receive it by January 31. Provide a clear, concise summary of the essential details about your Calendar Event.*

## JAN 11, 12

**FT. MYERS, FL** The Fort Myers ARC, Inc., will host their Southwest Florida Hamfest & Computer Show at Shady Oaks Community Center, 3280 Marion St., Ft. Myers FL, Friday 1 p.m.-9 p.m., and Saturday 9 a.m.-3 p.m. Set up will begin Friday, January 11th from 10 a.m.-4 p.m., and Saturday January 12th from 7 a.m.-9 a.m. Talk-in on 146.880 MHz. Registration is \$5 per person, good for both days. Please include SASE for advanced tickets, otherwise tickets will be held at the door. Vendor tables are \$15 per 8 ft. table (2 days). Electric is \$5 for 2 days. All vendors must buy an admission ticket. No tables reserved without payment. Children 12 and under are admitted free, but must be supervised. Tailgating, \$10 for the first space (includes 1 admission ticket). \$5 each for extra spaces. On-site security will be provided. Lots of free parking available. Handicap parking next to the building. FMARC supports FCC regulations and will not permit selling uncertified or modified equipment during the show. For information, contact *G.E. Sammons WA4DQE* at 941-936-1431, or E-mail [*wa4dqe@juno.com*]. For table info, contact *Earl Spencer K4FQU* at 941-332-1503, or E-mail [*k4fqu@juno.com*]. Write for tickets or tables to FMARC, P.O. Box 61183, Fort Myers FL 33906. Motels are available nearby.

## JAN 19

**ST. JOSEPH, MO** The 12th annual Northwest Missouri Winter Hamfest, co-sponsored by the Missouri Valley ARC and the Ray-Clay ARC, will be held 8 a.m.-3 p.m. at the Ramada Inn in St. Joseph MO. The motel is located at I-29 and Frederick Ave. (Exit 47 on I-29). Special room rates are offered for hamfest participants. Talk-in on 146.85 and 444.925. VE exams, major exhibitors and flea market all indoors. Free parking. Advance tickets \$2 each or 3 for \$5; at the door, \$3 each or 2 for

\$5. Pre-registration requests received after January 6th will be held at the door. Swap tables \$10 each for the first two tables. Commercial exhibitors are welcome, write for details: *Northwest Missouri Winter Hamfest, c/o Neal WBØHNO or Carlene KAØIKS Makawski, 3704 Meadowoak Ln., St. Joseph MO 64503. E-mail [nem3238@ccp.com]; or phone: 816-279-3406.*

## JAN 20

**HAZEL PARK, MI** The Hazel Park ARC's 36th Annual Swap & Shop will be held at the Hazel Park High School, 23400 Hughes St., Hazel Park MI, 8 a.m.-2 p.m. General admission is \$5 in advance or at the door. Plenty of free parking. Tables \$14. Reservations for tables must be received with a check. No reservations by phone. Talk-in on 146.64(-), the DART rpt. For info about the swap, tickets, or table reservations, mail to *HPARC, P.O. Box 368, Hazel Park MI 48030.*

## JAN 26

**LOCKPORT, NY** A Hamfest/Auction will be presented by the Lockport ARA, Inc., at Eagles Hall, 6614 Lincoln Ave., corner of Davison Rd., starting at 8 a.m. Vendor set up at 7 a.m. The auction starts at 12 noon. Talk-in on 146.820(-) 107.2 PL. Admission \$5, tables \$5 per 8 ft. table. Food will be available. Contact Event Chairman *Duane Robinson W2DLR, P.O. Box 142, Ransomville NY 14131, phone: 716-791-4096, E-mail [W2DLRHAM@AOL.COM].* Visit the Web site at [*http://lara.hamgate.net*].

## JAN 27

**DOVER, OH** The Tusco ARC Hamfest will be held Sunday, January 27th, at the Ohio National Guard Armory, 2800 North Wooster Ave., Dover OH 44622, 8 a.m.-1 p.m. Set up at 6 a.m. Talk-in on 146.730(-). Directions: Exit Interstate 77 at Exit #87 (Strasburg). Turn right at the exit stop sign, heading south on County Road 74 to the first traffic light. Continue through the traffic light intersection. The armory is on the right. Admission \$3 donation at the door. Dealers admitted free of charge. Tables \$10 each. Food available on site and the restaurant next door opens at 7 a.m. ARRL/VEC Exams by appointment. For additional info and to reserve tables, contact *Gary Green KB8WFN, 32210 Norris Rd., Tipton OH 44699. Phone: 740-922-4454. Table reservations*

payable by check or money order to *Tusco Amateur Radio Club*. Payment must accompany reservation and be received by January 20, 2002. Tusco ARC reserves the right to re-sell your space if you are not present by 9 a.m. Please bring your own extension cords. 120 volts is available.

**STICKNEY, IL** The Wheaton Community Radio Amateurs Midwinter Hamfest, featuring a ham radio, computer and electronics flea market, will be held at Hawthorne Race Track, 3501 S. Laramie, Stickney IL, January 27th, 8 a.m.-1 p.m. Flea market tables, commercial booths, VE exams, free parking. Talk-in at 145.390. Tickets \$6 in advance, \$8 at the door. Contact *WCRA, P.O. Box QSL, Wheaton IL 60189. Get more info at the Web site [http://www.wheatonhamfest.org]. E-mail [info@wheatonhamfest.org], phone: 630-545-9950.*

## FEB 3

**LORAIN, OH** The Northern Ohio ARS will sponsor Winterfest 2002 at Gargus Hall, 1965 N. Ridge Rd., Lorain OH, 8 a.m.-1 p.m. Directions from the East — Take I-90 or the Ohio Turnpike West to the Rt. 57 exit. Go north on Rt. 57 to the first light and turn left. Get in the right lane. The hall is on the right side about a half mile down. It is after the first light and right before Marco's Pizza. Directions from the West — Take I-90 or the Ohio Turnpike East to the Rt. 57 exit. Go north on Rt. 57 to the first light and turn left. Get in the right lane. The hall is on the right hand side about a half mile down. It is after the first light and right before Marco's Pizza. From the South — Many routes cross Rt. 57. Take 57 North through Elyria. Turn right when 57 goes north to Lorain. Pass the turnpike and I-90 to the first light past I-90 and turn left. Get in the right lane. The hall is on the right hand side about a half mile down. It is after the first light and right before Marco's Pizza. Free pancake breakfast. Talk-in on NOARS rpt. 146.700(-) and 444.800(+). Ample all indoor commercial space, reservations required. Tickets \$5 each at the door; includes 1 admission and 1 breakfast. Breakfast will be served from 8 a.m. until 11 a.m. only. 6 ft. tables are \$10 each. All workers require an admission ticket. Set up for vendors begins at 6 a.m., doors open to the general public at 8 a.m. For info contact *John Schaaf KB8JWS* at 216-696-5709, or write NOARS via E-mail at [*noars@qsl.net*], or write to NOARS Winterfest, P.O. Box 432, Elyria OH 44036-0432. 73

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# Build This Simple Electronic Keyer

*One of the nicest little projects we've seen.*

*One way for the CW radio operator to send almost perfect Morse code is to use an electronic keyer. Most commercially available keyers are relatively expensive, but it is easy to build a low-cost keyer using TTL devices and a single 556 dual-timer IC.*

The keyer features a variable clock speed rate and a sidetone oscillator. It can be used to key a CW transmitter or as a CPO (code-practice oscillator). The circuit operates from any conventional 5-volt DC source. Since it draws only 40 mA of current, it can even be battery-powered, providing many hours of operation from ordinary penlight (AA) cells. For a longer span of time, C or D cells can be used. A power supply is included if you want to run it off house current. See Fig. 2.

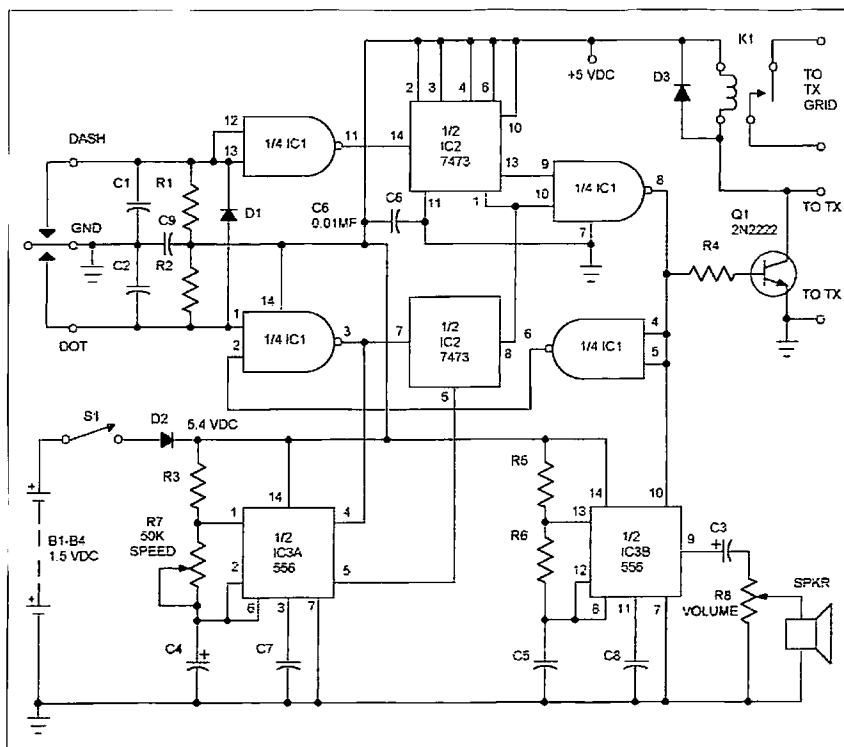
## How it works

Quad 2-input NAND gate IC1, as shown in the schematic, eliminates most of the diodes commonly used in other keyer circuits and provides a TTL-level signal for the remainder of the circuit. Dual flip-flop IC2 generates the dits and dahs in a 3:1 ratio, with the spaces being one dit wide. Timer IC3A serves as the system clock generator, with potentiometer R7 acting as the speed control. The second timer IC3B generates an audio tone signal when gated, producing a sidetone so that you can hear what you are sending out.

Output transistor Q1 is required if you intend to use the circuit to key a transmitter. If negative grid keying is desired, add reed relay K1 to the circuit as shown. This relay isolates the

keyer circuit from the voltages used in the transmitter. Another way you can go is to use an optical isolator instead

*Continued on page 56*



**Fig. 1.** Relay circuit is for negative-grid keying, and sidetone oscillator for code practice.



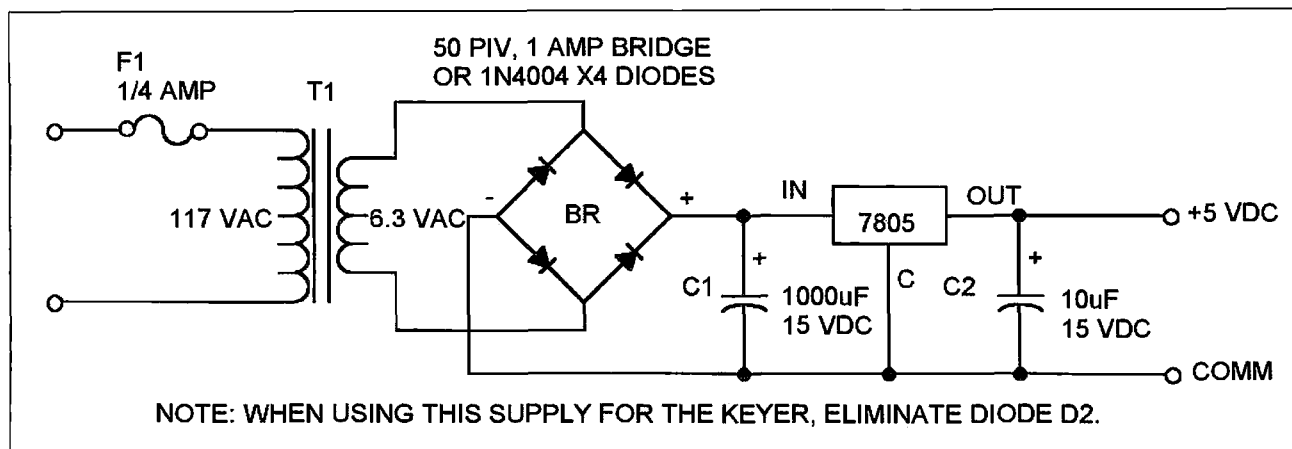


Fig. 2. Power supply.

## Build This Simple Electronic Keyer

continued from page 55

of the relay, but it would be too much to explain here.

The circuit can be assembled on a piece of perforated board, using a point-to-point wiring technique. Or you can design a printed circuit board.

There is nothing critical about parts placement or lead routing.

If you prefer, you can substitute two separate 555s for the 556 IC3. Speed control potentiometer R7, which mounts on the front panel of the chassis box in which the keyer is to be housed, should have a reverse-log taper to improve the linearity of the

keyer. The side-tone oscillator can be adjusted to produce a desired tone in the speaker.

If you plan to use the keyer with a transmitter, the circuit must be housed in a grounded metal case to reduce the possibility of RF interference. You can easily fabricate a paddle keyer. Mount it so that the contacts are inside the metal box, with the paddle arm exiting through a slot in the box. Make certain that the paddle arm moves freely from side to side and without contacting the metal case box.

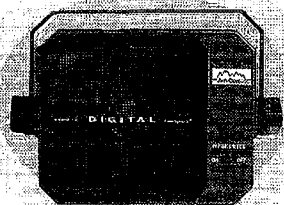
Part No.	Description
B1-B4	1.5 V cell
C1, C2, C6-C8	0.01 µF disc capacitor
C3	1 µF 16 WVDC electrolytic capacitor
C4	2 µF 16 WVDC electrolytic capacitor
C5	0.02 µF disc capacitor
C9	0.1 µF disc capacitor
D1	1N4148 or 1N914 diode
D2, D3	1N4001 diode
K1	Reed relay 5 V coil
Q1	2N2222A transistor
SPKR	8 Ω speaker
S1	SPST switch
R1-R3, R5	1k 1/4 W resistor
R4	2.2k 1/4 W resistor
R6	47k 1/4 W resistor
R7	50k reverse log taper pot, front panel
R8	1k pot, front panel
IC1	7400 quad 2-input NAND gate IC
IC2	7473 dual flip-flop IC
IC3	556 dual timer IC
Miscellaneous: Perforated or printed circuit board; suitable metal case or box; battery holder; 2 control knobs; paddle assembly; hookup wire; solder; machine hardware, etc.; IC sockets; 4 rubber feet or rubber pad or metal plate; heat sink for Q1.	

Table 1. Parts list.

After assembling the keyer, check out its operation in both the transmit and CPO modes.

73

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## The ABCs of IRCs

*continued from page 30*

exchange for postage stamps in the foreign country. Consequently, many people use U.S. dollars (often euphemistically referred to as "green stamps") instead. A very broad rule of thumb says that buying a new IRC costs almost exactly the same as US\$1. Although U.S. dollars are not so readily available as IRCs outside the U.S., they can be purchased from most High Street banks or bureaux de change, although they do attract a small surcharge as commission. Some U.K.-based QSL managers currently offer surplus US\$1 bills for sale at around £0.70 each.

Generally, all QSL managers prefer to receive U.S. dollar bills than IRCs, as they can be turned into cash rather than postage stamps. Quite apart from anything else, no one is likely to argue that a \$1 bill is not valid! However, the new \$1 coins and low-value hard currency notes other than U.S. dollars are especially unwelcome, simply because such notes as 1000 Italian lire, 25 Austrian shillings, and the like are of so little value that they are not accepted for exchange by the banks and are thus worthless to the manager. Applications containing such currency are sometimes returned via the bureau, with the money and an explanatory note included. 73

an impending storm.) and high wind. Depending upon your area, temperature extremes or flash flood warnings might be even more useful.

I was impressed, but now it was time to move to the next step. There are weather stations and there are ham radio weather stations. Now it was time to connect the weather station to the ham station (we older folks remember station-to-station calls, but that has nothing to do with this). This called for the last piece left in the box — the Ultimeter 2000 serial port. The serial cable comes with software that logs the information from the U-2000, but it is also easy to interface the weather data to the popular WinAPRS program. Depending upon the program you are using, you can set the U-2000 to output a steady stream of data, a weather record every five minutes (ideal for APRS), a detailed stream of data, or connected to a modem. The packet mode provides updated information frequently, about every five minutes. Normally, I transmit weather data every ten minutes unless bad weather is forming (when I will drop to every five minutes), so this is ideal.

WinAPRS is the program I use, and the weather station works flawlessly with the system. I had a little trouble at first, but not due to the weather system or the APRS. It took me a while to realize that COM1 can be serial port 2 and vice versa. Oops. Once I figured that out, everything else went great. With WinAPRS you can click on a particular station's icon and access its current weather data, or even the weather history. You can also set WinAPRS to display only other weather stations and chosen measurements.

Having a weather station is great. When I get up in the morning I check the E-mail and the weather data. I'll look at the other stations in the area and compare what is happening. We've all seen it rain a short distance away while enjoying sunshine where we stood, so we know that weather is not actually constant throughout a city or area (regardless of what the TV weatherman says). I find it interesting to see how different things can be throughout the area. This is also helpful in trying out

your predictive powers. Let's see, wind is from the southwest at 10 miles per hour. They're reporting rain 5 miles in that direction. Sounds like we may get wet in about half an hour.

When I'm at work or on the road, it's kind of fun to tap into the Internet gate (IGate) connections to see how weather is in the backyard. You can connect to [<http://wx.findu.com/ke8yn>] to get a reading. IGates collect information off the air and pass them along to the Internet, so your weather data is available to the National Weather Service, other hams, or just plain weather junkies.

The bottom line? If you're looking for something new to add to your station, you've got to check out the Peet Brothers line of weather systems. Try their Web page at [<http://www.peetbros.com>] for general information and an interactive demo of the Ultimeter 2000. They are located at 31 E. 17th Street, St. Cloud FL 34769; 1 (800) 872-7338 or (407) 957-9786. 73

## The Peet Brothers Ultimeter 2000

*continued from page 39*

includes date, time, the barometric pressure, etc. The next step was to step through each of the displays. The unit usually displays the wind direction and one other measurement including wind speed, the temperature, chill factor, dew point, barometric pressure, rainfall, and humidity. You can even set it up so that it alternates through the various readings that interest you on a rotating basis. It can also show any significant change in any of fifteen readings. The two that I find most useful are a rapid rate of change in barometric pressure (a key indicator of

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## THE DIGITAL PORT

*continued from page 43*

fine programs, he came back to me directly and announced the fact that what I needed was a "real computer." Funny thing, now that I have this new whiz-bang setup, those are two of the programs that don't like the "real computer."

While I think of it, most available ham software works great on Windows 98. To me, for our purposes, the better combination is a fast processor, buckets of RAM, and Windows 98. And you can't buy that combo at the store. It has to be a do-it-yourself project.

That is not a condemnation of any product or anyone — it is simply a fact. Whatever works best for you in your computer with your radio is what is best for you. I have yet to try one or two of the old standby programs that would not run on the old computer to see how they react to this environment. And I know at least one of those programs is being used by a whole bunch of hams, because I converse with them frequently.

That's about it for this month. Have a Happy New Year. And if Wayne is feeling generous, perhaps he will allow me to spill over into your shack during the next twelve months. If you would like to ask questions about these subjects, feel free to E-mail me at [KB7NO@worldnet.att.net]. 73 until next time, Jack KB7NO. 73

## HOMING IN

*continued from page 52*

electronic and postal mail addresses at the beginning of this article.

### Footnotes

1. Moell, Joe, "Homing In: Up, Up and Away," *73 Magazine*, January 1992.

2. Boyd, Jerry, "You Can Build the FoxFinder 80," *73 Magazine*, November 2000.

3. Moell, Joe, "Homing In: A New Millennium for Foxhunting," *73 Magazine*, January 2001.

4. Moell, Joe, "Homing In: Foxhunt Fun at the Friendship Games," *73 Magazine*, October 1993.

5. Moell, Joe, "Homing In: City of Roses and Foxes," *73 Magazine*, October 1999. 73

## ON THE GO

*continued from page 53*

Sound impossible? Don't worry, there is a product that will handle these needs with no hassle whatsoever.

The A & A Engineering "Smart Battery Charger" may be one of the best headache-savers for hams requiring emergency backup power. Designed to work with either lead acid or gel-cell batteries, the Smart Battery Charger provides the type of charging current the battery needs for its current state, as well as providing current to the load. Most important of all, the charger will not overcharge your battery.

The secret is the UC3906, an IC specifically designed for this purpose. This chip permits the charger to switch among three modes of operation, bulk, absorption, and maintenance. When hooked to a battery, and with AC applied, the charger checks the battery's voltage. If it is less than 6 volts, the charger will not attempt to charge the battery, since this low voltage may indicate dead cells in the battery. If the voltage is between 6 and 12 volts, the charger enters bulk mode, which provides the highest current to the battery. As the charge level rises to about 95%, the charger enters into absorption mode. At this stage the charger attempts to raise the voltage from 2.3 volts per cell to 2.4 volts. Finally, when the battery approaches its full charge, the charger switches to maintenance mode. In maintenance mode the current is reduced further — all the way to zero if and when necessary. Unlike a trickle charger, the ability to drop the charging current provides better protection and longer life for the battery. This is why the charger can be left hooked to the battery and turned on indefinitely.

The A & A Smart Battery Charger is available either assembled or as a kit. Construction is straightforward on a printed circuit board and should present no problems for most hams. The unit is mounted in a metal case with a switch and indicator LEDs. The LEDs show which mode the charger is in at any given time. I have to admit I don't often worry about the LEDs because the unit has worked so flawlessly that I do not worry about its performance. Many chargers used with gel-cells are notorious for their RFI. Since the A & A charger is specifically designed for use in amateur radio, it is well filtered and does not create any harmonic interference.

After the World Trade Center and Pentagon attacks in September, I brought a mobile 2-meter rig into my office at the hospital. Even though we have multiple redundant power supplies including a

generator, not every outlet or device is connected to the emergency power. I brought in a 17 Ah gel-cell and the Smart Battery Charger. My ability to operate two meters and 440 MHz in the event of an incident is now firmly placed on my "Things Not To Worry About" list.

Be sure to put this on your shopping list if you have any interest in emergency or disaster communications. 73

## QRX

*continued from page 7*

will take to develop, or whether they will ever be deployed.

Thanks to Telecom Daily, via Newsline, Bill Pasternak WA6ITF, editor.

## Words of Wisdom

- I care not for a man's religion whose dog or cat are not the better for it. — Abraham Lincoln (1809–1865)
- The man who claims to be the boss in his own home will lie about other things as well. — Amish saying
- Fall seven times, stand up eight. — Japanese proverb
- You may have a fresh start any moment you choose, for this thing we call "failure" is not the falling down, but the staying down. — Mary Pickford
- Always do right. This will gratify some people and astonish the rest. — Mark Twain
- Today is a gift. That is why it is called the present. — Unknown
- Happiness is not a station you arrive at, but a manner of traveling. — Margaret Lee Runbeck
- The only real voyage of discovery consists not in seeking new landscapes but in having new eyes. — Marcel Proust
- A lion chased me up a tree, and I greatly enjoyed the view from the top. — Confucius
- Life is what happens to you while you're making other plans. — John Lennon
- You can take all the sincerity in Hollywood, place it in a fruit fly's navel, and still have room for three caraway seeds and a producer's heart. — Fred Allen
- You must learn from the mistakes of others. You can't possibly live long enough to make them all yourself. — Sam Levinson
- There are two possible outcomes: If the result confirms the hypothesis, then you've made a measurement. If the result is contrary to the hypothesis, then you've made a discovery. — Enrico Fermi
- When you have eliminated the impossible, whatever remains, however improbable, must be the truth. — Arthur Conan Doyle (1859–1930)

*Continued on page 59*

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## QRX

continued from page 58

- Nostalgia is like a grammar lesson: You find the present tense and the past perfect. — Unknown
- Most people reach the top of the ladder of success only to find it is leaning against the wrong wall. — Unknown
- There's a fine line between genius and insanity. I have erased this line. — Oscar Levant
- The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn. — Alvin Toffler
- No one is much pleased with a companion who does not increase, in some respect, their fondness for themselves. — Samuel Johnson
- Journalism is merely history's first draft. — Geoffrey C. Ward
- Good communication is as stimulating as black coffee, and just as hard to sleep after. — Anne Morrow Lindbergh
- Cleanliness is next to clean-limbed, in the dictionary. — Unknown
- The two secrets to success: Don't get lost in the woods, and don't go in your old lady's pocketbook. — Archie Burnett, Vermont farmer
- Always hold your head up, but be careful to keep your nose at a friendly level. — Max L. Forman
- I have every sympathy with the American who was so horrified by what he had read about the effects of smoking that he gave up reading. — Henry G. Strauss
- Worry is like a rocking chair: It gives you something to do, but it doesn't get you anywhere. — Dorothy Galyean
- The second day of a diet is always easier than the first. By the second day, you're off it. — Jackie Gleason
- Never raise your hands to your kids. It leaves your groin unprotected. — Red Buttons
- A conference is a gathering of important people who singly can do nothing, but together can decide that nothing can be done. — Fred Allen
- They think they can make fuel from horse manure. ... Now I don't know if your car will be able to get thirty miles to the gallon, but it's sure gonna put a stop to siphoning. — Billie Holiday
- Why should people laugh at the idea of making fuel from garbage? After all, they make TV from it. — quoted in *TV Guide*

From the ARNS Bulletin; the Internet, with special thanks to Gardner Johnson; other sources as noted. **73**

## NEVER SAY DIE

continued from page 4

Maybe you've wondered where the American Radio Relay League got its name.

I'd like to see some articles for 73 on more ways hams can use digital communications. How narrow a bandwidth can today's compacting algorithms achieve?

Slow-scan TV was fine for 30 years ago. Isn't it time we developed a way to compact real-time video for use on 20m?

## Emergencies?

How many clubs have an emergency communications van? Let's see some pictures and descriptions. This will goad other clubs into trying to do even better. With the changes in the weather, we're likely to see more and more natural emergencies where ham communications will help. Has your club's van an emergency repeater that can be set up to handle local communications in the event of a hurricane or earthquake?

When a hurricane hit St. Lucia I sent an editor down there with a couple suitcases of ham gear to help out. Ever since, I've been treated like royalty when I've visited St. Lucia. I was even thanked by the governor. Maybe you've read my \$5 *Caribbean Travels* book?

Some prophets with distressingly good records have been predicting a catastrophic event in the next few years. If an asteroid hits, or the earth's crust shifts, our emergency systems are going to be needed. Will we be ready?

Being ready for emergencies is important, but of equal importance is making sure that the public knows about it. Get photos and stories into the papers and on TV, and talk it up on talk radio. Oh, yes: Please send me copies so I can build a file.

## Quid Pro Quo 2002

In return for our billions of dollars of radio spectrum, we have to pay the piper in some way. In the past we were able to supply trained radio operators. Well, that was important 60 years ago. We amateurs helped significantly in WWII, but today the military has no need for us.

International goodwill was another benefit we were supposed to provide. Is that what you call those pileups demanding a 30-second contact and a QSL card? Sure. With the world able to watch American TV, the few foreign amateurs we bother to actually talk with is insignificant.

Technical education? Hmm, when was the last tech session held at a radio club meeting? Anyone remember? A few years ago, I ran a wonderful 26-part tech series by Peter Stark K2OAW. I'm not sure anyone bothered to read it. I admit I've lost track of what's out there to help newcomers learn about technology. I know that none of the publishers have sent me review copies in years. If you've found any outstanding books, please write and let me know so I can pass along the word.

## Sea Power

One source of energy that's available and so far not used is the movement of the ocean waves. The estimates are that electricity generated this way would cost about 12¢ per kilowatt hour. That's competitive just about anywhere. But for islands, where coal or oil have to be imported to run power generating stations, this could lower power costs substantially.

All it takes is a series of floats which operate pumps on the bottom. The pumped water would then turn generators, just as hydroelectric plants in our dams do. Presto, wave action can be turned into electricity.

## Health Insurance

D'ja notice that the average hike of health insurance last year was 15%? Insurance companies, which get a percentage of the cash flow, have little interest in keeping medical costs down. They just pass along the high and higher cost of drugs and hospital care, building bigger and more beautiful buildings.

Companies could help cut the sickness costs for their employees by encouraging the concept of prevention. Very few people seem to understand that their health problems are caused by their lack of care for their bodies. The coffee, Danish, and candy machines that most companies have for their employees are helping to increase sickness care costs.

## Super Pork

As long as the public has their eyes glued to the TV being entertained, Congress can spend our tax money any way they want. Every now and then, something gets so outrageous that even Congress can't stand the stink of pork. Alas, not often.

They're still pouring billions into hot fusion. Scientist welfare. They stopped

Continued on page 61

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# Special Forecast

*During January, the average Maximum Usable Frequencies (MUFs) are at their lowest annual values in the northern hemisphere. This seasonal phenomenon means that the higher bands (i.e., lower frequencies) will perform the best, so the bulk of activity will be found on 20 through 40 meters.*

**B**e sure to explore elsewhere, however, since a bit of patience on apparently “dead” bands can sometimes net a rare contact or two. Getting away from the crowd in this way positions you to take advantage of sudden favorable swings in DX propagation.

At this writing (late September), we are seeing sunspot numbers and flux values above 300 — the highest recorded since 1991. This has been quite a surprise and not particularly good for the HF bands, due to numerous geomagnetic disturbances from solar flares and CMEs. I expect to see a return of this intense activity in the new year, which is why I've indicated mostly Fair-to-Poor (F-P) conditions on the calendar. Don't be dissuaded from getting on the air, however: Just expect a little extra challenge.

Given the current interest in Afghanistan and Pakistan, you might try working 20 meters for openings to those countries. Although amateur stations aren't numerous over there, it will be a good test of your technical skills to see if you can make a few contacts anywhere in that area. Expect the aurora to be your main bugaboo, because the "pipeline" to that region runs very close to the poles. Although the shorter path is to the north, you might find that propagation is better on the long path across the Antarctic summer.

To check the accuracy of my Time-Band-Counter chart, I regularly listen to commercial broadcast bands worldwide. By doing so I am able to follow current propagation conditions, but am also reminded that many people still rely heavily on their shortwave radios for news and entertainment. There is certainly some interesting stuff to be heard that you aren't likely to get from domestic sources. If you haven't done so in a while, turn off the TV and computer, tune up your old SW set, and see if you don't have a

Continued on page 61

January 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
		1 P	2 P	3 F-P	4 F	5 F
6 F-G	7 F-P	8 P	9 VP	10 F-P	11 F	12 F-P
13 F-P	14 F	15 F-G	16 F-P	17 F-P	18 F	19 F-P
20 F-G	21 F-G	22 F-P	23 F-P	24 P	25 F-P	26 F-P
27 F-P	28 P	29 VP	30 F-P	31 F-P		

EASTERN UNITED STATES TO:													
Country	CA	FL	GA	NC	SC	VA	MD	DE	PA	NY	CT	RI	MA
Central America	15 (40)	20 (40)	20 (40)	(40)	(40)	(20-40)	(15-20)	10-20	10 (20)	10-17	10 (20)	(10)	20
South America	(15) 20	20 (40)	20 (40)	20 (40)	x	x	(15-20)	x	(10)	10 (15)	10 (20)	(10)	20
Western Europe	40	40	40	40	(40)	x	(10-20)	10 (20)	(10)	20	(15-20)	(20)	(20-40)
Eastern Europe	(20-40)	(40)	x	x	x	x	x	(10-12)	10 (17)	(121 17)	(15-20)	20	
Southern Africa	(40)	(40)	x	x	(20)	x	(10-20)	(10)	20	x	x	x	
Middle East	(40)	(40)	x	x	x	x	(10)	(10-15)	15 (20)	20	(20)	(20)	
India	x	x	x	x	x	x	x	(15-20)	x	x	x	(20)	
Pakistan	(15) 20	20	(20)	(20)	x	x	(20)	x	x	x	x	(10-20)	
Far East/ Japan	(15-20)	x	x	x	x	x	x	(10-20)	(10-15)	x	x	x	
Southeast Asia	(10-17)	(15-20)	x	x	(20)	(30-40)	(20-40)	(10-20)	(10-20)	x	(20)	(10-15)	
Australia	15-17	20-30	x	x	x	20-30	20-30	15-17	15-17	x	x	15-17	
Alaska	(10) 15	(20)	20	(20)	20 (40)	40	(20-40)	(20)	(15-20)	x	(10)	10 (15)	
Hawaii	(10) 40	(15) 40	20-40	20-40	40	40	40	(20-40)	(10-20)	10-20	10-20	10-20	
Western USA													
CENTRAL UNITED STATES TO:													
Country	CA	FL	GA	NC	SC	VA	MD	DE	PA	NY	CT	RI	MA
Central America	(15) 20	20 (40)	(20) 40	(20) 40	(20) 40	40	(40)	(10) 20	10-20	10-15	10 (20)	15-20	
South America	(15) 20	20	20 (40)	20 (40)	(20)	x	x	x	(10)	10	10 (20)	(10) 20	
Western Europe	(40)	40	40	(40)	x	x	(20)	(15) 20	(10) 15	(15) 20	(20)	x	
Eastern Europe	20	(20)	x	x	x	x	x	x	(10-15)	(10) 15	15 (20)	20	
Southern Africa	x	(40)	x	x	x	x	x	(10) 20	(10-20)	x	x	x	
Middle East	x	(40)	(20)	(20)	x	x	x	(10-15)	(10-15)	(20)	20	(20)	
India	x	(15)	x	x	x	x	(20)	x	(15)	x	x	x	
Pakistan	x	x	(20)	20	(20-40)	(40)	(20)	20	(15-20)	x	15	(15)	
Far East/ Japan	x	x	x	x	(20)	20	(20)	20	(15-20)	(15)	x	(15)	
Southeast Asia	(10) 15	15	(15-20)	20	(20)	20-40	20-40	(20)	x	x	x	(10-15)	
Australia	15-17	15-17	x	x	x	(40)	(40)	20	20	x	x	x	
Alaska	(10) 15	(15-20)	20	20	(40)	(20-40)	20-40	x	(15)	(15)	(15)	(10) 15	
Hawaii													
WESTERN UNITED STATES TO:													
Country	CA	FL	GA	NC	SC	VA	MD	DE	PA	NY	CT	RI	MA
Central America	(20-40)	40	40	40	(40)	x	(20)	(10) 20	10 (20)	10 (20)	(10) 20	(15) 20	
South America	17 (40)	(20)	x	x	x	x	x	(15)	12 (20)	10-20	10-20	12 (40)	
Western Europe	x	x	(40)	(20)	(20)	x	(20)	(10-20)	(10) 20	(20)	x	x	
Eastern Europe	(20)	x	x	x	x	x	x	x	(10)	(15)	15 (20)	(15) 20	
Southern Africa	x	x	x	x	x	x	x	x	x	x	x	x	
Middle East	(20)	(40)	(20)	20	20	(20)	x	(15)	(10) 15	(10-15)	(20)	(20)	
India	(15-20)	x	x	x	x	x	x	(20)	x	x	x	x	
Pakistan	(10) 20	(15-20)	x	x	(40)	40	(40)	x	x	x	(10-20)	10-20	
Far East/ Japan	(15)	(20)	x	x	x	x	x	(20)	(15) 20	20	(10-15)	10-15	
Southeast Asia	(10-15)	(15-20)	x	x	x	(20-40)	(20-40)	x	(15-20)	15	(10-15)	10-15	
Australia	10-15	x	x	20-30	20-30	20-30	20-40	20	20	16	x	15-17	
Alaska	(15) 20	(15) 20	20	(20)	(40)	40	(20-40)	(15) 20	15 (20)	(10-15)	10 (15)	10 (15)	
Hawaii	(10) 40	(15) 40	20-40	20-40	40	40	(20-40)	(10-20)	10-20	10-20	10-20	10-20	
Western USA													

**Table 1.** Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



## Propagation

continued from page 60

little old-fashioned fun with it — I'll bet you do! 73, and Happy New Year.

### Band-by-Band Summary

#### 10–12 Meters

Only reliable a few hours a day at this time of year. As always, these bands open in the east at dawn, follow the sun westward, and close in the southwest in the afternoon. No nighttime openings are expected. Short skip can range from 1,000 to 2,500 miles.

#### 15–17 Meters

Expect some reliable overseas openings, especially to the southern hemisphere. Try Southeast Asia in the late afternoon for some exotic contacts. As always, signals will peak before noon toward the east, around midday to the south, and toward the southwest in the afternoon. Short skip will extend beyond 1,000 miles.

#### 20 Meters

This will be your mainstay as usual, but may suffer occasionally during the stronger solar outbursts. It is still your most versatile HF band and you can usually find openings from dawn to late evening. On good days 20 might even remain open all night if fluxes reach the 300-plus level. Short skip can fluctuate from as little as 500 miles during the day to as much as 2,500 miles at night.

#### 30–40 Meters

These bands will provide some good worldwide openings, but only after dark. Southern Europe, the Middle East, and Africa can remain open in the evening when propagation is good, but Central and South America will usually dominate the nighttime hours. Asia and the Pacific won't open up until after midnight, but if you can stay awake some exotic contacts can be made there. Short skip should extend beyond 700 miles.

#### 80–160 Meters

Often very good at this time of year because atmospheric noise is at a seasonal ebb, but unusually low MUFs could close these bands down on many days. DX openings can sometimes appear in the east right after sundown, but both bands are primarily for "night owls" when open. Short skip on 80 is typically beyond 2,000 miles while skip on 160 averages closer to 1,500 miles. 73

## NEVER SAY DIE

continued from page 59

pouring billions into the super collider project. Too much was going to just one state. The space station is out there — doing what? Well, after the Moon landings and the shuttle, Congress had to spread around a few more billions to contractors and the thousands of highly paid employees at NASA.

The latest scam is the reviving of the Star Wars project to build a system to protect us from missiles. The December 2001 issue of *Discover* has a ten-page article explaining in detail why this project is total pork. As soon as we manage to design a system which can sort out a real warhead from a bunch of fakes, they'll start lobbing multiple warhead missiles at us. Or, thousands of small packages of anthrax the size of Wheaties boxes.

How much of this waste of your money is it going to take before you lift your eyes from the tube as say "baa"?

These guys you have been unable to stop yourself from electing and then re-electing are fleecing you. You know the job pays when a senator will spend several million dollars to get re-elected. Pays very, very well. In other words, these bozos are putting on a great show for you, and getting a big piece of the action.

The reality is that we are sitting ducks for any intercontinental ballistic missiles any country lobs at us. We cannot shoot them down. We are not going to invest in a way to shoot them down.

Those Patriot missiles during the Gulf War? Shooting at slow, easy targets, they were at most 6% effective.

The people who are pushing for us to spend billions on missile defense are mostly nontechnical. Politicians. The top people at the Defense Department are political and managerial, not technical.

### Negative People

A recent study reported in *Time* (May 14, 2001, p. 62) confirmed that people who express negative emotions do not live nearly as long as positive people. That's good news. It's a real drag when you know someone who invariably thinks in terms of the negative side of everything and who sees or suspects the negative side of everyone they meet. No matter how excited you may be about a new idea, this person will find a potential downside if you try to share it.

The study also points out that Alzheimer's can be postponed by a diet change to leafy green vegetables. Also, the more active you are in using your

brain, the less likely you are to get Alzheimer's. Playing chess and Scrabble and doing crossword puzzles are great preventatives. As a crossword and cryptogram addict, that's comforting to know.

Thanks, Rocky (a fan in Santa Clara CA) for sending those bundles of *NY Times* puzzles. I usually knock off the "Solution time: 24 minutes" puzzles in about eight to ten minutes. Yep, I'm bragging.

### MMR–Autism Link

Doctors in the U.K. found the measles virus in the intestines of children who developed autism after a healthy infancy. All of them developed autism after receiving the MMR vaccine. That's the combination of mumps, measles, and rubella vaccination.

Again, we've been conned by the medical industry. If you prefer to believe your kindly family doctor about vaccinations, at least do me the courtesy of reading a book or two exposing this scam. Like Coulter's *Vaccination — Social Violence and Criminality — The Medical Assault on the American Brain*. This exhaustively referenced book shows the connection between vaccinations and autism, mental retardation, criminality, and a few other downsides — like death. About a thousand babies a year die. The medical industry calls that an acceptable loss.

Or read Walene James' *Immunization — the Reality Behind the Myth*.

Could a childhood MMR shot make the difference between a CBer and an Extra Class ham? Over to you, good buddy.

### The Ham Industry

With the lack of newcomers, plus the lack of significant new ham technologies, the ham industry is hurting. And since the normal corporate reaction when there is a downturn in business is to cut advertising, thus guaranteeing a further drop in sales, this has slimmed down the ham rags. And this, in turn, has limited the space available for my editorials. This has not stopped me from writing, so I've been posting my newer essays on my Web site every few days, and then taking them off after a week or so.

The Wayne's Weird World section is right up front when you go to [www.waynengreen.com].

### The Cell Game

Yes, our HTs and repeaters have spawned the multi-billion-dollar cell

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## NEVER SAY DIE

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phone market. Good for us, bad for consumers.

You see, those little antennas people are holding up to their heads are slowly burning out brain circuits. Yes, I know all about the "controversy" over the danger. There's only a controversy because the cell phone industry doesn't want to find itself in the mess big tobacco's in.

The leading researcher in the field, Dr. Ross Adey K6UI, has confirmed beyond any doubt how dangerous these little gadgets can be. If you absolutely have to be connected 24/7, then get a phone with an antenna that's not close to your head.

Naturally, the scam artists got right to work and are making a bundle selling wave shields to the ignorant. These gadgets do virtually nothing to protect one's brain. Though this should be totally obvious to anyone with even a vague understanding of radio, *Good Housekeeping* went ahead and ran tests. The result? None of the five leading brands had any significant lowering of a cell phone's radiation exposure to the brain.

Fortunately, like the damage sugar and milk products do to your body, the burnout is slow, so the user's IQs and memories are just gradually blown away. The downside is that if you stop poisoning your body it can recover, but those fricasseed brain cells are pfffft for life.

### Drug Testing

Bet you didn't know that most of the drug testing for FDA approval is done by the drug companies seeking the approval. Would it surprise you to know that many of these tests are rigged? That problems are swept under the carpet? All of which explains the parade of FDA-approved drugs which later have to be taken off the market when the adverse reactions and side effects can no longer be hidden.

A recent study by the U.S. Agency for Health Care and Quality of 192 drug trials, each with a minimum of 100 patients, brought this: "We found no instances where the safety reporting can be deemed satisfactory." They found that the severity of the side effects were not reported in over 60% of the trials, and the drug toxicity in over 70%.

Happy pharmacy, sucker.

### Cancer Answer

According to the April 26th issue of *Nature*, scientists have proven again that a strong immune system prevents cancers from forming. They did it with mice. Never mind that Dr. Lorraine Day

has proven with her own body that a strengthened immune system can reverse and cure even near fatal cancers. In her case she was so near death when she decided to cure herself that she'd been given last rites. Well, it was a last wrong in her case.

If you know anyone with cancer, for heaven's sake have them get her *Cancer Doesn't Scare Me Anymore!* video. Call her at 800-574-2437 — and say hello from Wayne. I sent her a copy of my *Secret Guide to Health* and she called to say that my book is right on the money.

Since I'm not an MD, you may believe her more than you do me. Dr. Day was a leading San Francisco trauma doctor. Now she's busy trying to get the word out on how anyone can cure cancer and almost any other disease just by changing one's lifestyle. As she says, "There are no incurable diseases."

Let's try to stop the medical industry's \$50,000 lumpectomies and mastectomies just by changing our diets.

### Home PCs

Fifty-one percent of households have at least one computer. It was 42% in 1998 and about 10% in 1984.

It wasn't all that long ago that DEC president Olson couldn't imagine why anyone would ever want a computer at home. So much for the tunnel vision that killed the minicomputer industry ... Data General, Wang, Prime, Centronics, and many others.

Don't laugh ... just think of the thousands of people who worked for those companies for years, only to find their jobs gone as a result of their tunnel vision. They didn't understand what was going on, so they blindly stuck with what they should have recognized as a slowly sinking ship. Then one day their ship sank.

My advice is to aim toward starting your own small business, and do it before you see the torpedo coming toward your employer's ship. After the pink slip panic has set in is no time to start planning.

Most people (like 99%) live in the present. They've got a job, they commute to work, they go home at night and watch TV — probably a ball game. They may even read a newspaper, though they don't bother with more than the sports pages. Then the fan gets hit.

Unlike DEC's Olson, Data General's De Carlo and An Wang, and their employees, look for a need or a service in the field you know best that you might be able to satisfy. Maybe it's information and you could write a book? Or as a consultant, if you've taken the time and effort to become an expert in something. If

you haven't by now, what in the hell is wrong with you?

It pays to have a fallback in case that paycheck suddenly stops. It pays even better to get your small business started nights and weekends so you can grow it and stop being an employee.

### Lied To

Gotta nice E-mail from Chris KAØBLT about my review of *You Are Being Lied To*. "It's one of those books that once I pick it up, I can't put it down. Thanks for the recommendation!"

Another nice E-mail came from Steve Weber KD9BO. "Keep pounding your message into the thick skulls of the sheep. Maybe some of it will make its way into their consciousness. I wish you had a wider audience, since hams are infamous for being set in their ways. You would be a great Art Bell program host!"

Yep, it would be fun (for a while) to be a guest host on the *Coast-to-Coast* show. I'm friends with the authors of books the public needs to hear from. They'd make great guests. But that would take an awful lot of time and I'm pathetically behind as it is — what with starting *NH ToDo* magazine with the goal of keeping the recession from doing New Hampshire people any damage. And then, if I can find an angel with \$750,000, I'd like to get a magazine started that will do for education what *Byte* and my other computer magazines did for PCs. Imagine kids of all ages, anywhere in the world, being able to learn anything they want and have a ball doing it! And at a cost of about 10% of our government-run public school system.

On the other hand, I've found that most people prefer being sick and dying to changing their lifestyle. The wife of a good friend of mine in her 50s is dying of multiple sclerosis and cancer, yet there's no way to get her to stop drinking Diet Coke and eating a diet of chips and chocolate. Raw food? No way! Oh, she's also taking an array of prescription drugs.

That reminds me of when the ARRL pulled their Incentive Licensing disaster in 1963. That forced about 95% of the ham industry out of business, continuing to advertise in *QST* until QRT.

### Hydrogen

One of the events I'll never forget was around 1930 when our school turned out to watch the dirigibles fly over. There were the *Hindenburg*, the *Graf Zeppelin*, the *Akron*, the *Macon*, and the *Los Angeles*, all flying over at the same time. Wow, what a sight! And what a sound, too.

Continued on page 64



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156pp). \$10 (#005)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Bioelectrifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about

the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

**Wayne's Caribbean Adventures:** My super budget travel stories - where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Cold Fusion Journal:** They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

**Julian Schwinger:** A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

**Dowsing.** Yes, dowsing really does work. I explain how and why it works, opening a huge new area for scientific research with profound effects for humanity. \$2 (#84)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. I explain the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts - like Hapgood, Einstein, Snow, Noone, Felix, Stiebert. \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with readers who worked for

NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system - the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 Editorials:** 120 pages, 100 choice editorials. \$10 (#72)

**1997 Editorials:** 148 fun-packed pages. 216 editorials. \$10 (#74)

**1998 Editorials:** 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)

**1999 Editorials:** 132 pages of ideas, book reviews, health, education, and

anything else I think you ought to know about. \$10 (#76)

**2000 Editorials:** 76 pages (thinner magazine as a result of our slowly dying hobby) \$5 (#77)

**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Silver Colloid Reprint.** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Kit.** Three 9V battery clips. 2 alligator clips & instructions. \$5 (#99).

**Wayne's Bell Saver Kit.** The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

**Cold Fusion Six-Pack:** Six Cold Fusion Journal back issues to bring you up to speed. \$20 (#19)

**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs - such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$35 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon you wondered at their weird gait. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of giveaways that the photos and films had to have been faked. \$46 (#93)

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This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

**Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the March 2002 classified ad section is January 10, 2002.**

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## NEVER SAY DIE

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Then, with the crash of the *Hindenburg*, the lighter-than-air era instantly ended. Never mind that the American dirigibles were using helium. We'd refused to sell it to Germany, so they had to use hydrogen — and the burning of the *Hindenburg* at Lakehurst proven how dangerous that was.

Only it wasn't the hydrogen that caused the fire — in case you haven't read about it. The main problem was the extremely flammable outer skin of the ship. Hydrogen, when it burns, makes an almost invisible blue flame. The men who built the airship knew right away what the problem was, but they kept it a secret — a secret which scientists just recently figured out. They didn't want to be blamed for their lousy design.

The *Hindenburg's* five-coat paint job was what did it. The cotton-cloth exterior was coated with a layer of iron oxide and then four coats of cellulose butyrate acetate mixed with powdered aluminum — very similar to rocket fuel like that used in the shuttle's boosters. It was painted with rocket fuel!



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#### E-Mail

design73@aol.com

#### Web Page

www.waynecgreen.com

**COVER:** Dan Smith K4BES, Birmingham AL, sent in this shot of his 2001 Field Day site. What you don't see are his two 3-foot balloons above at 300 feet. Attached to 150-lb. construction cord, they supported a 65-ft. W3EDP antenna made of #26 wire.

## QRX ..

### Fat Birds Fly Better

About twice a year, we bring you stories about radio tagged migratory birds. In most cases, it's those ever-elusive burrowing owls. Now we have a totally different kind of bird story. It still involves radio tracking, but this time to see if bigger birds or smaller birds have a better chance to survive in flight.

European scientists have discovered what seems like a contradiction about migrating birds. They found that the fatter the bird, the more efficiently it appears to fly.

Researchers at Lund University in Sweden have studied several small species including the Red Knot. In our hemisphere, these 20-ounce wading shorebirds travel 18,000 miles every year, to the tip of South America and back to the Arctic. On the way north, they stop on the shores of New Jersey to feast on the eggs of horseshoe crabs, to build up energy for the last 2,000 miles of their northward trip, which they make nonstop. On these binges, the Red Knots can double their normal body weight.

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article [IBM (ok) or Mac (preferred) formats], carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

### NEVER SAY DIE

Wayne Green W2NSD/1

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www.waynegreen.com

#### Hey, ARRL, Wake Up!

My reaction to the 9/11 attack was that this was just the beginning. As I've been writing for a couple of years, it's just too easy to use germs such as anthrax to wipe out millions of people. Now we learn that the worst virus yet, ebola, has been aerosolized by scientists, who since seem to have recently either disappeared or met untimely ends, and is in terrorists hands. Great.

Since our government seems to be busier covering things up than dealing with new threats, we don't have any national communications backup system in case the power goes off. Except us, and we've been taking our cue from Ethelred the Unready, aka Newington in this incarnation.

I have to admit as to not being totally surprised at my not getting letters or photos from ham clubs about their efforts to set up emergency communications systems or to try to activate the inactive hams in their area.

#### Conspiracy Mongers

I'd try harder to ignore conspiracy theorists if history hasn't proven them right so often. In the WTC case, one of my readers called to say that it was a smart move to ground all commercial flights immediately after the attack. He said box-cutters were found hidden in the seats of 21 of the grounded flights. Then I got E-mails asking why the FAA didn't respond immediately when the flights

changed course and stopped communicating. And how come in these days of packed planes, these particular flights had so few passengers?

#### Cover-ups?

Thanks to the persistence of Robert Stinnett (*Day of Deceit*) we now know that the conspiracy nuts of sixty years ago were right. Roosevelt really did plan the Pearl Harbor attack. If you can find a copy of Fred Goerner's *The Search for Amelia Earhart* (1966) in your local library you'll find out about the huge government cover-up in her case.

Anyone who has been so isolated from facts that they believe the government isn't covering up on UFOs needs to get a copy of Col. Corso's *The Day After Roswell*.

#### The Anthrax Scare

If you read *The New Yorker* you know that the anthrax deaths have been caused by a weaponized variety of anthrax which started with a dead cow in Ames, Iowa. It has a lot of folks afraid to open their mail, but it seems unlikely that it has been spread by any foreign terrorists.

On Saturday evening, November second, I was invited to be a guest on the Coast-to-Coast AM radio show, with Barbara Simpson as the host. This show is carried by over 500 stations nightly and has a huge audience, despite its weird time slot from 1 to 6 a.m. Eastern time.

One of the first questions that came up was how we can

deal with bioterrorism. I pointed out that the best defense is to be very, very healthy. In even the worst plagues there have been people who didn't get sick, and others who survived the sickness while others were dying by the thousands.

Healthy? According to the Department of Health about 1.5% of Americans are truly healthy.

The details on how anyone can recover from any illness and be totally healthy are in my *Secret Guide to Health*. The secret is simple, as I've been trying to hammer into your consciousness: Stop poisoning your body. My book discusses the poisons.

However, I explained, until you achieved health, you're going to want to have some damned good antibiotic on hand. Lots of it. And, waiting until people around you are dropping is not the time to queue up at your doctor's waiting room to get a prescription. Of course, hoping that what you get, if the drug store hasn't run out, hasn't been compromised by the pathogen (as most have).

The answer, of course, is silver colloid, which no germ or virus has been able to survive. And fortunately, this is ridiculously inexpensive, even if you buy it at a health food store. But the cheapest way is to make it yourself. You can dig out the 1997 73 article by Tom Miller on the history of this ancient antibiotic, how to make it, and how to use it. Then you need a source of 99.999 pure silver wire (five nines in the trade). See the

Radio Bookshop ad in page 63 for an inexpensive source of the silver, a little kit of the battery and alligator clips, and a reprint of Miller's article. The three items are \$25.

The result of my talking about this was a deluge of orders via my Web site [www.waynegreen.com], by fax, telephone, and bushels of mail orders for both my health guide and the silver colloid making kit. Whew!

I also explained how the blood purifier could help by cleaning any virus or germ out of the blood, generating orders for the *Blood Purifier Handbook* and a big demand for Plant Growth Stimulators.

Naturally I went into the big need there would be for amateur radio for emergency communications, and that resulted in our getting hundreds of new subscribers.

#### Ramifications

The people I've talked with were mainly worried about surviving a bioterrorism attack. Few had considered anything beyond their and their families' immediate survival. But, if there is a serious bio attack, it could kill millions of the unprepared and that would bring the country to a halt. Without railroads the power grid would shut down. Without daily truck deliveries there would be no food or fuel. How prepared are we for that? Echoes of Y2K.

Should we gamble that this scenario is so preposterous

*Continued on page 8*



continued from page 1

Over the past few years a number of European Red Knots were radio tagged and tracked by the Swedes as they prepared for a similar trip between the British Isles and the Russian Arctic. The study indicates that building up of fat deposits to be burned as fuel during the migration is more than worth the energy that it takes to carry the additional weight. The heavier birds apparently use their muscles more efficiently. Just why this is so remains a mystery. Even stranger is that the results seem to "fly in the face" of a central theory of aerodynamics — no pun intended of course.

So what does this have to do with ham radio? Well, it points out that research always seems to yield unexpected results, and it gives us a chance to remind you that dozens of ham operators in western states were listening for the VHF radio tags on endangered Burrowing Owls this winter. You could help out, too, next time. Find out how by visiting [www.homingin.com]. Who knows, maybe a ham will make a similar startling discovery about the migration habits of these unique critters. That's homingin — one word — for the Web site: [homingin.com].

All of this really does go to show that the more mankind uses science to discover the secrets of Mother Nature, the more amazed man is at what he learns.

Thanks to Joe Moell KØØV ("send no jokes about birdbrains, please") and Ecology Today, via Newsline, Bill Pasternak WA6ITF.

## Hamvention 2002: Forums Schedule Announced

If you are thinking about attending the 2002 Dayton Hamvention, then go to its Web site and click on the Forums area. Forums Chairman Jim Ebner N8JE says that the initial schedule for May's Dayton Hamvention group discussion sessions is now on-line.

As previously announced, the theme of the 2002 Hamvention is Emergency Communications. In keeping with the theme, some of the highlights include Gordon West WB6NOA explaining how to use the Global Positioning System. Gordo will also show how it offers hams the ability to know where they are and describe where they are to better than a foot. That's very important information to have on hand when working an emergency situation.

But that's not all. Also on hand will be John McHugh KU4GY, the Coordinator for Amateur Radio National Hurricane Center, W4EHW. McHugh will show the volunteer public service work of the gang at W4EHW, and the inside workings of the National Hurricane Center in Miami.

KU4GY will also detail two exciting projects called CARMEN and CWOP that they are working on in conjunction with NOAA. What are they?

You will have to attend his session at Hamvention 2002 to find out.

Vermont's Mitch Stern W1SJ, will also be there to talk on techniques used by the best operators involved in emergency communications. This session will also include information on the proper way to communicate during emergencies. Also hosting a session will be Mid-Cars on the importance of mobile-to-mobile and mobile-to-base communications during emergency times.

Amateur Radio Newsline will also be there once again hosting the Live Town Hall Meeting. Bill Pasternak WA6ITF, will moderate a session on Ham Radio Emergency Communications in the 21st Century titled "Looking to Apply What We Have Learned from the Past."

And also look for other popular sessions, including Carole Perry's Youth Forum and Joe Eisenberg KØNEB with the latest in kits and how to build them.

Want to know more? The latest information on Hamvention 2002 is always on the Web at [www.hamvention.org].

Thanks to DARA and Don Wilbanks KC5MFA, via Newsline, Bill Pasternak WA6ITF, editor.

## America at War: FCC Gettysburg Changes Mail Address

At least for package deliveries, the FCC's Gettysburg, PA, office has announced that it has moved its mail handling facilities off-site.

The reason is the same as reported for the FCC in Washington — simply a precaution in case some of the strange people we all call terrorists decide to target the Gettysburg licensing facility.

It's all fairly simple. Effective immediately, all overnight couriers, United Parcel Service, and Federal Express deliveries have to go to a new location. That address is the FCC Gettysburg, Rear Entrance, 35 York Street, Gettysburg PA 17325.

The change does not affect US Postal Service deliveries. At least not yet. They will continue to be accepted at the office's physical address on Fairfield Road and diverted to the off-site mailroom.

Thanks to the FCC, via Newsline, Bill Pasternak WA6ITF, editor.

## National Antenna/Tower Consortium Formed

Members of a newly formed "Antenna/Tower Consortium" made their debut at Shorecliff Communications' 2001 Tower Summit. The Consortium was formed to promote a consistent and fair national antenna policy.

After a year of preliminary work, the National Antenna/Tower Consortium was incorporated in Washington DC and members made their first public appearance October 29th, at the Tower Summit in Las Vegas.

The National Consortium was formed as a response to increasing difficulties antenna and tower users, whether broadcast, public safety, cellular, radio-common-carrier, private radio, two-way, amateur, or others face in siting, constructing, and modifying antenna systems.

Member Barry Umansky described the current situation as "a patchwork of inconsistent and sometimes irrational local regulations that result in a slow and expensive approval process and needless litigation." Fred Baumgartner explained that the goal of the Consortium "is to bring together antenna users to develop a fair and reasonable set of guidelines for antenna regulation, with the intention of advocating adoption of a national set of standards."

The pair explained that they "believe an FCC license should bring with it some assurance that the licensee can actually build, modify, and operate the radio facility." They noted that Digital Television, cellular, and routine expansion of existing facilities are being held hostage to a growing number of antenna restrictions based largely on aesthetic concerns. They pointed out that antenna regulations and bans are fast becoming a national epidemic.

Unlike public policy decisions that are based on safety, security, or as part of an overall planning process that balances conflicting objectives, antenna regulations too often appear to be based exclusively on vague aesthetic concerns unsupported by hard evidence, the Consortium members explained. The Consortium also believes that policies that would encourage co-location, antenna reuse, aesthetic design, and other accommodations should be part of an overall set of national standards.

The Consortium is in the process of recruiting and serving members representing a wide array of communications technologies and companies. The new organization is raising public and industry awareness, attracting funds and other contributions to support the enterprise, and soliciting volunteer assistance needed to make the organization an effective voice. Mr. Umansky noted that "anyone who has ever fought an antenna battle will tell you that there is something dreadfully wrong with the way the process works. It now is time to get groups with different agendas to work together for the success and advancement of over-the-air communications."

The Consortium can be contacted at [antennatowers@hotmail.com], and maintains a Web site at [www.antennatowers.tvheaven.com].

Thanks to Fred Baumgartner, Parker CO.

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## Tune In the Universe

*Tune In the Universe* is a new book on CD-ROM by SETI League Director H. Paul Shuch N6TX. The book is unique both in that it is interactive with the reader and because it can be read using any Web browser. No special reader software is required.

Why a book now? N6TX says that it's kind of overdue:

Shuch: "I've been on the lecture circuit for SETI for the past seven years, and everywhere I go people ask if I have a book about all of this. Well, we have a Web site but not everybody has an Internet connection and some other people's download speeds are a bit slow. So I took the best material from seven years of running the SETI League and tried to put it together in one convenient place."

And that's exactly what Dr. Shuch has done. Called a ham radio operators' guide to the search for extraterrestrial intelligence, the book is divided into six sections that cover every aspect of ham radio's involvement in SETI as well as the ongoing search itself. Also included are a mix of photos and even some songs that Dr. Shuch says should educate as well as entertain. Why music you ask? N6TX says that it's a fun way to learn about anything:

Shuch: "As any teacher knows, memory is enhanced and multiple learning styles are accommodated by invoking as many different sensory pathways as possible. That is, we educators try to stimulate the students auditory, visual, and tactile systems all at once to maximize the learning experience. Why do you think we are always writing on a chalkboard and asking you to take notes while we drone on in a monotone?"

"Somewhere along the line in my teaching career I figured out that music was another sensory pathway worth stimulating. And, just maybe would make my lectures a tad less monotonous. So I began introducing songs as learning aids."

*Tune In the Universe* is published by the American Radio Relay League and is priced at under \$25. For more information visit the League's Web site at [www.arrl.org]. More about the SETI League is also to be found in cyberspace. It's at [www.setileague.org].

Thanks to N6TX and the SETI League, via Newline, Bill Pasternak WA6ITF, editor.

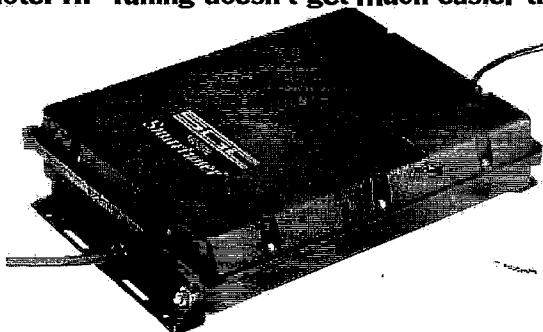
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## NEVER SAY DIE

continued from page 4

that there's no need for us to organize an amateur radio emergency system? Are you comfortable with waiting until something happens and then hoping that we can somehow get organized?

If you've read Duncan Long's *Bioterrorism* (see the review on page 34 of my *Wisdom Guide*) you know how easy and inexpensive it would be for an enemy to kill a hundred million or more Americans within a few days with today's bioweapons. And you know that the terrorists have been taking flying lessons and checking on crop-spraying planes.

If you've been following the testimony of bio experts in the media you know this is a lot more than an exercise in media gloom and dooming.

Are you set up to make silver colloid? Have you bought or built a blood purifier yet? I've published the circuits for both. What plans have you and your local ham club made to provide emergency communications for your town?

### Lying

I keep trying to get you to tape the Art Bell show (Coast-to-Coast AM) every night, so you won't miss it when Art has some outstanding guests. Yeah, I know, a lot of the time it's like reading the *National Enquirer*, but now and then he has guests which make the effort worthwhile.

Steven Greer and some other recent guests who have thoroughly researched the UFO-ET situation recently held a national press conference, complete with the testimony from some very high military and government officials, explaining how the secret government behind our government has been covering up the reality of UFOs and ETs. Did you read about it in the papers or hear about it on the TV news? You bet you didn't.

The many leaks about the Roswell crash, along with the

often ridiculous military efforts to cover it up, fueled the urgency for independent investigation. The endlessly blacked-out papers from government agencies responding to Freedom of Information requests on the subject have not inspired confidence.

Art Bell has aired several interviews with people who claim they've seen salvaged UFOs at the Area 51 base in Nevada, and their stories were consistent and credible. Then there was Col. Corso's book, *The Day After Roswell*, which claimed he was the man in the Pentagon who facilitated alien technology recovered from UFO crashes being used by industry to help them develop transistors, printed circuits, lasers, night vision, and other new technologies. Corso died soon after the book was published, and his son is convinced that his father was murdered to shut him up.

The main concern is that the military, along with pressure from contractors, are getting Congress to fund more star wars developments. The purpose of these is not to protect us from Saddam or North Korea, or even from what's left of Russia, but to be able to combat the ETs.

Government reports so far uncovered make it clear that our military are well aware that we are being, and have been, visited by several ET groups. These visits stepped up significantly when we went nuclear in 1945. That seems to have rung a galactic alarm bell.

The ETs are so far ahead of us technologically that they could, at any time, stomp us out. But, they seem more interested in monitoring our activity and, perhaps, helping in some subtle ways to guide us.

So, why are the military thinking in terms of attacking ETs? That's an easy one.

If you know anything at all about the military — or government — or even big business, you know that the only way to get ahead is to not cause trouble. Report for work, look like you're busy, file the required reports, and

wait for seniority to move you up the ranks. Thus, our generals and admirals got to their places on the Joint Chiefs of Staff by never having any creative ideas which might get them in trouble.

As the Admiral of the Queen's Navy put it in *Pinafore*, "I polished up the handles so carefully, that now I'm the ruler of the Queen's Navy." Queen Elizabeth was not amused.

It was this mass stupidity at the Joint Chiefs level that made such a mess of our war in Vietnam. And Somalia. And Haiti. And Kosovo.

I had a close brush with Admiral Bruton, who was in charge of our forces in Europe. It's been a while since I've told that story — I'll have to do it again. It's a great story. What a jerk he was!

All it takes to tape the Coast-to-Coast AM show is a radio and VCR. You plug a cable into the radio's earphone jack, and the other end into the AUDIO IN jack on a VCR. Then you program it to tape the audio (LINE). The show is on from 1-6 a.m. here in the East, and it comes in on about 20 stations up and down the dial.

I listen to the show while I'm fixing and eating meals, fast-forwarding through the prostate commercials and news, and also any time wasted on listener call-ins before the guests come on, usually in the 2nd hour of the show.

Since there are so many electrically challenged people, I've put together a little VCR taping kit which I've been selling for \$5, complete with programming instructions. It's a good seller. It's in my catalog as item #83.

Yes, the UFOs are real. Yes, ETs are here and have been, possibly for thousands of years. Yes, they communicate by telepathy. And yes, they may well be influencing what we're doing. No, there's no indication that they mean us harm. The consensus is that they've been watching us develop, perhaps nudging us now and then, and that eventually, when and if we grow up, they will be welcoming us

to some sort of galactic federation.

If all this is unreal to you, it means that you haven't bothered to read much that's been written by some outstanding researchers. My *S5 Secret Guide to Wisdom* reviews several books which will help you come up to speed.

### College? No, Thanks!

You know, I haven't had one critical letter about my claim that college is a huge waste of time and money as far as being successful in life is concerned.

Rudi Mangold HB9BU kindly sent me a six-page article from *Forbes* (12/28/98) which backs me up.

Yes, there are a few career paths for which a sheepskin is mandatory — architects, pharmacists, elementary school teachers, lawyers, doctors, and physical therapists. Around 30% of the workforce requires a college degree.

In the main, a college degree will help get you a job with a large corporation or the government. If all you aspire to is a job with a large corporation or the government, you'll never be more than a small cog in the wheel, never a wheel. Well, make that a spoke these days.

I'm urging you to shoot higher in life. To be successful. To contribute to making life better for others. To help move civilization ahead a little.

The *Forbes* article points out that the figures showing that college grads make more money than high school grads is a distortion of reality. They showed that real estate brokers (no degree) average more than double the pay of grads with biology, social sciences, liberal arts, education, and home economics degrees.

My recommendation is to learn to be an entrepreneur — to own your own business. Here, the extra four years of noncollege education gives you a huge advantage over grads.

If it's a little late for you to

Continued on page 59



# Weather Sat Tracking is Awesome!

*Real science means real fun for 8- to 12-year-olds!*

*In January 1993, I happily retired from work as an engineer in the telecommunications industry. I was soon surprised that I missed the social side of work. I missed the day-to-day contact with people who understood what I did, the technical conversations, and (although I hate to admit it) some of the meetings. I also found that I had few local friends, since my work had really prevented me from being an active part of my community.*

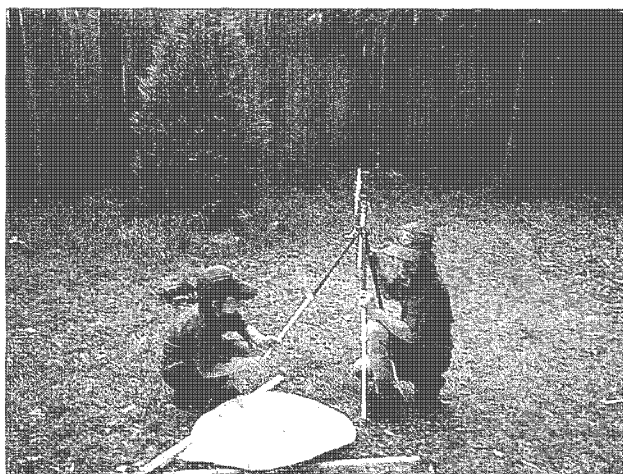
Here in Australia, or at least in Sydney, our primary (elementary) schools are small and locally based. Support from the parents is encouraged, with Moms mainly helping out with reading, music, school sports, canteen, and the like. Few dads are available during the day, and when they retire, primary school kids are far down their list.

Some months after I retired, I found myself at my local primary school's orientation meeting (presented mainly

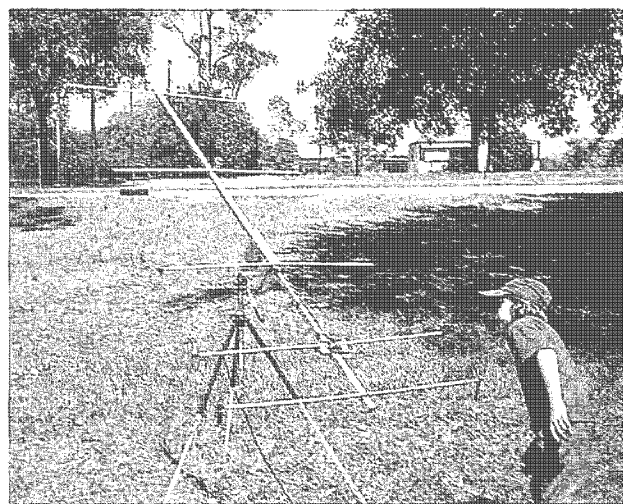
for the parents of new incoming students), and heard the usual appeal for help from the principal. After the meeting, I cornered the principal, told him I was a retired engineer, and asked him if he would like for me to "donate" a hands-on science program for his school. He agreed, but I could tell he had heard it all before and expected me to appear maybe a couple of times and then fade away. Little did we know at the time that in the following years I would help give the same talk

to parents, and would actually outlast the principal and attend his retirement party!

The school was for grades K through 6, had an enrollment of about 115 students, and had a staff of 5 teachers. The setting was in a semirural environment with small market gardens or hobby farms surrounding the area, and most important, was only about 3 minutes from home, so I could duck in and out. The principal was a teaching principal in addition to his administrative

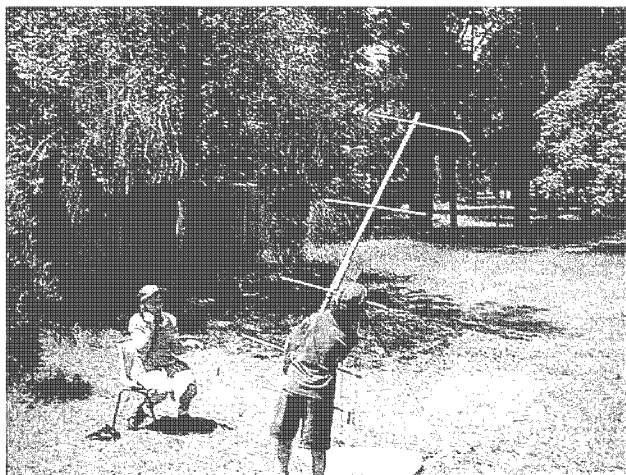


**Photo A.** Julian and Daniel orienting and setting up the antenna pedestal.

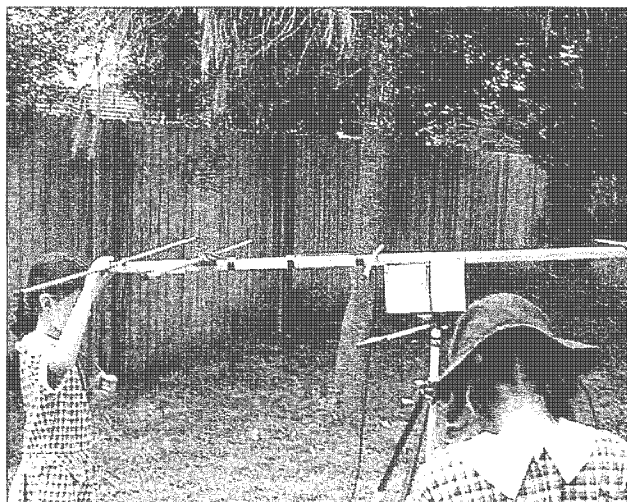


**Photo B.** Julian aligns the antenna for the next pass.





**Photo C.** Olivia and Julian on a high elevation pass — it's going right overhead!



**Photo D.** Inclinometer for setting elevation angles during track.

workload, which made him really appreciate any assistance or relief from the same old routine. The overall "mission" was to expose the students to as many areas of science and technology as I could — such as chemistry, electricity, some electronics, computing history, binary math, computer programming (QBASIC), current theories on the origin of the universe, our solar system, space mechanics, and accident prevention and analysis. (Hidden agenda: Showcase various technical career paths!)

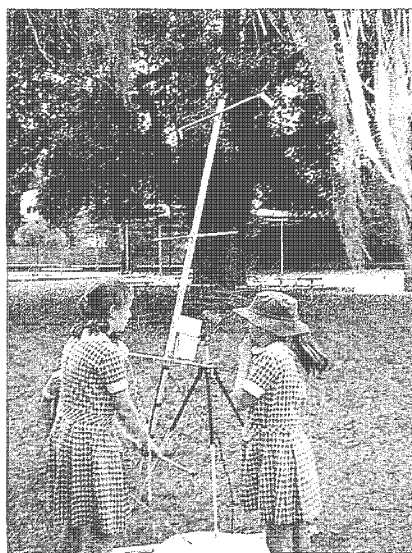
The big project for the school year was satellite tracking!

Early on in the year, I announced

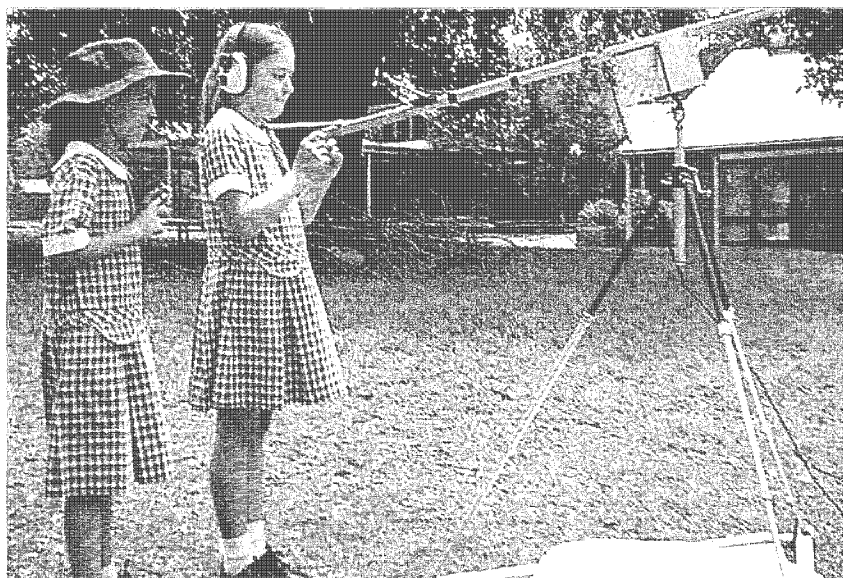
that later we would be playing with a few billion dollars' worth of toys in earth orbit. I explained that what we would be doing is probably at the university level and certainly no other primary schools in Australia would be doing live satellite tracking. I emphasized that this project would NOT be a demonstration. *They* would be trained, and *they* would do it, not me. They would be expected to "walk the walk and talk the talk." (Hidden agenda: Take the students well outside the primary school envelope.)

As an absolute minimum, two lecture sessions are needed to prepare the class. It is extremely useful, however,

to present a number of other science sessions to build credentials and get to know the students and teachers. These two essential sessions are a nonmath version of orbital mechanics and a session on space industry jargon. It is explained that jargon is a shorthand way of speaking so as to minimize communication time and the possibility of misunderstanding. Typical items would be AOS, LOS, rise time, look angles, AZ, EL, apogee. The students were also drilled on compass directions and how to minimize confusion by saying AZ/EL in a standard way with individual numbers for direction (two three nine) and words for elevation (up

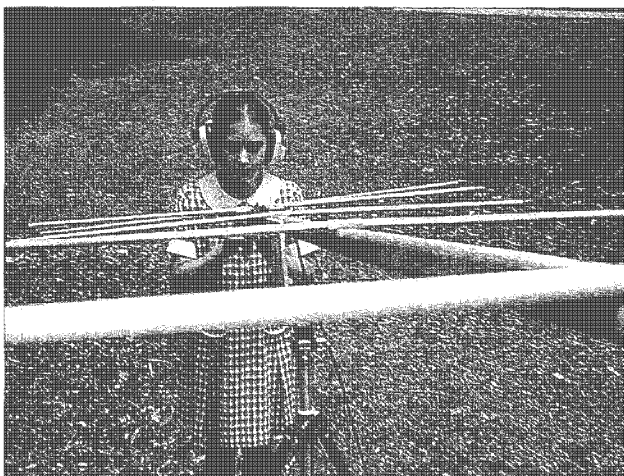


**Photo E.** Kate and Janel doing a difficult overhead azimuth reversal.

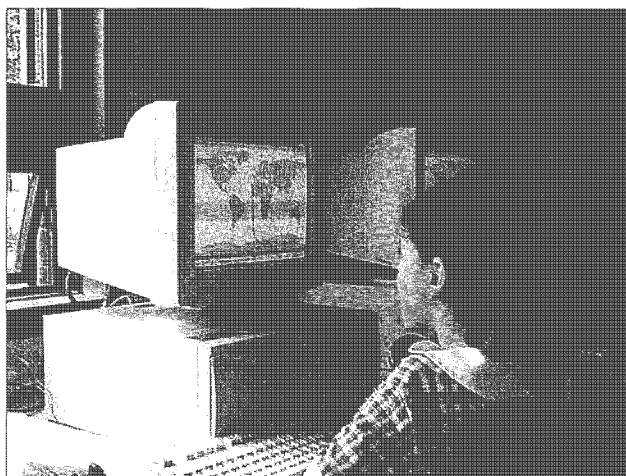


**Photo F.** Kiara and Janel concentrating on a good track in progress.





**Photo G.** Janel tracking while using live telephone data from the acquisition crew.



**Photo H.** Kiara on the telephone link, passing WINTRACK pointing data to the antenna crew.

twenty-two). Handouts of all lectures are prepared in advance and passed out after each session. This in itself is unusual, with the students treated as adults, complete with printed review notes. Well-prepared handouts also tend to underline that this project is really special and important.

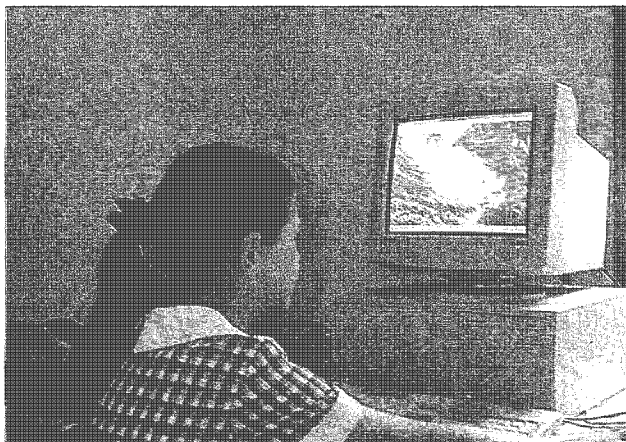
There are a number of other things that should be done in advance to prepare for the satellite tracking exercise. Antenna construction is the first sub-project. This should be started early because of the time it always seems to take. The students can do this any way they like, individually or as teams, as long as the antennas are electrically sound, essentially correct in the dimensions, and we get a few antennas. It is primarily a recycling project where the students are given detailed

measurements to construct a three- or five-element yagi antenna for 137 MHz (or 146 MHz in the earlier years). The intention is to use as many of the "good" antennas as possible. When the antennas finally appear, they are prepared with a tail of coax and drilled so that they can be easily swapped on and off the antenna mount. It is also wise to put Styrofoam, corks, or tape on the ends of the elements to avoid any eye damage. They are then tested at school by ear against a local Morse practice beacon, or some other stable signal, to roughly check gain and directional characteristics. One of our best-performing antennas also takes the prize as the ugliest — split and cracked bamboo with fencing wire taped to the bamboo as elements. (Hidden agenda: Recycle.)

While all this is going on, the students are being assessed to identify the best and most interested. They will be selected as the team leaders or "pass controllers." The pass controller will be in charge of a team and will determine the pass times, downlink frequencies, and look angles in advance, supervise the daily equipment setup and breakdown, run the pass, and be prepared, during a live pass, to take over any other student's job if necessary. It is sometimes surprising as to who the pass controllers turn out to be. They are not always the best students, but can be kids with reading problems, classroom clowns, or other unlikely choices. In any case, being a controller has status, and in some cases can be a child's first real success. (Hidden agenda: New opportunity to succeed.)



**Photo I.** Catherine and backup, Kate, at AOS on MET 3-5.



**Photo J.** Catherine with WXSAT video output of a large low pressure area.



The first few years, objects tracked were various Oscars, and *MIR*. A number of contacts were made with *MIR* on their packet BBS. Although it was in the "gee whiz" category, I am not sure the students always understood the significance of uploading a packet message to the *MIR* BBS and downloading it on the next rev along with any rare replies. We gave up on the RS series after 10 meter RF in the computer room zapped a modem in one computer and also damaged the motherboard in another. Next time, we will have a proper ground system. I seem to remember the damage was blamed on lightning over the Easter school break. Three years ago, we migrated to the 137 MHz weather sats, using WinOrbit and WXSAT software, both free over the Internet.

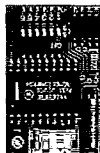
The equipment used for the last couple of years has been: a scanner (Uniden UBC9000XLT); WinOrbit and WXSAT software; a panning and tilting camera tripod tied to a triangular frame placed on the ground to prevent movement; a large cardboard circle about 2 or so feet in diameter, with compass directions heavily marked every few degrees; a home-made inclinometer to measure elevation; a quick mount on top with wing nuts so that antennas can be swapped easily; and a pocket compass to set up true north against magnetic north. Last but not least is a communication system to get pointing information from the acquisition and tracking computer to the antenna crew. Handhelds could be used, but we have always used some sort of telephone system. The easiest is two old telephones connected by a bit of twisted pair with an additional headphone jack at the antenna end. This is powered by four D cells in series with the line. Phones are best, as the students like to play with them but disconnect when hung up between passes. This could be another subproject in itself, and handled in a similar way as antenna construction.

The inclinometer is basically a heavy pointer mounted on a home-made scale of degrees elevation. As the antenna is

Continued on page 14

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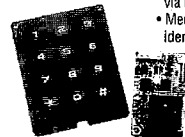
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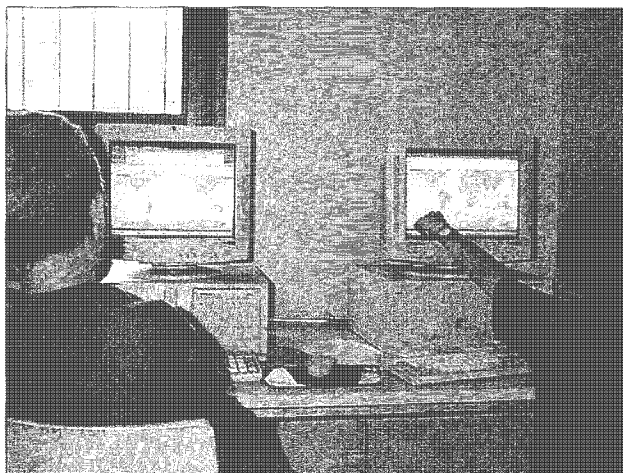
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**Photo K.** Daniel and Julian at AOS on RESURS using WINTRACK.



**Photo L.** Tom studying WXSAT video of a front moving across Australia. This is the downlink video.

## Weather Sat Tracking is Awesome!

*continued from page 13*

tilted, the pointer points straight down, indicating the amount of tilt on the degree scale.

The pass controller selections are announced as soon as possible. The new controllers are first trained on the software and taught how to set up the computers for the day, and then drilled on quick shifts from satellite to satellite and how to predict future passes. It is important that the inbuilt computer calendar and clock is checked every day, as other students seem to like to tinker with the settings. Take special care with the AM and PM settings! (Hidden agenda: Good results rely on good preparation.)

Next, the controllers learn how to set up the antenna mount, feedlines, and telephone link. Particular attention should be paid to setting the compass rose to true north. Our compass rose has magnetic north lightly marked in ball-point pen to help in aligning the compass rose with the magnetic compass.

Finally, the controllers complete their training with a number of live tracking exercises. All controllers are rotated through all of the positions. Six or so passes seem to be adequate. (Hidden agenda: Project leadership/management.)

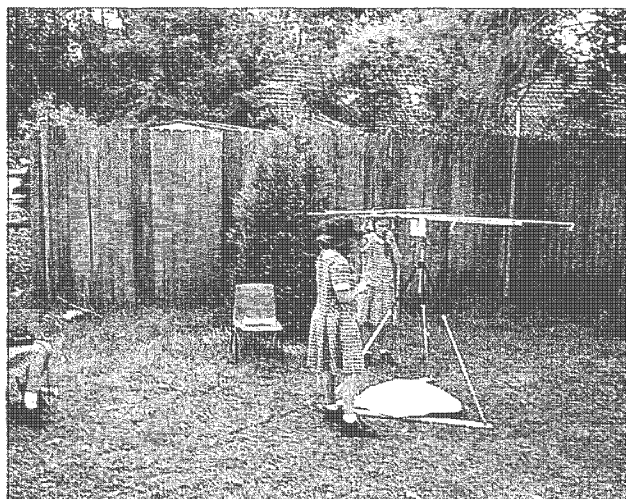
A typical class of about 30 would make up five teams consisting of one controller and a group of five students. The controller selects their team with the help of the teacher. If the teams turn out to be uneven, put the shorthanded

teams near the end of the schedule. This will allow any students who were sick or absent to get their chance. It is then the job of the controller to train his team. Occasionally one controller will help another with the training. Surprisingly, the teams choose to do a lot of their training on recess time and lunch time!

The team assignments are one pass controller as overall manager, two on the tracking acquisition computer running WinOrbit, two on antenna pointing, and one on the WXSAT radio downlink computer. I usually oversee the WXSAT computer so as to adjust for Doppler and do video restarts if necessary. The extra person on the two-person positions is to observe, prepare to rotate in, and constantly



**Photo M.** Daniel and Julian during a "midtrack" change to another satellite.



**Photo N.** Sat tracking is fun!



monitor the other person's work. Some job rotations can safely be done midpass. (Hidden agenda: Teamwork is the only way this exercise can be done.)

The controllers are instructed to try to set up approximately six weather sat passes per day for their team's turn. Choices will be made from the NOAA, Russian MET, and RESURS satellites, with advance checks to determine which of the satellites are active and transmitting on 137 MHz. Not quite so obvious is that passes must work around school hours, assembly times, and overlapping passes, although quick changes to switch satellites in a marginal midpass can be fun with a good team. Work through recess or lunch has not been a problem. Care must also be taken to select passes with reasonable elevations to extend track times, and if possible, to make sure that pointing angles will not be looking through buildings.

The students are amazed to actually hear the satellite at AOS and see live

pictures from space being painted onto the screen of the WXSAT computer as the satellite tracks overhead. Picture quality using the Uniden scanner is surprisingly good. Cloud patterns and coastal outlines are seen clearly. It is also important to prepare the receiver so that the satellite can be heard over the loudspeaker. Remember, a team is putting on their show and wants to be heard. My setup used the line audio output to drive the computer soundcard. Since the receiver volume control had to be turned down very low to avoid overdriving the soundcard, I added a variable resistor in the receiver-to-soundcard patch cord to attenuate the soundcard input and achieve a decent level of speaker audio.

A good yagi allows tracking right down into the weeds. Many times, the teams would be pointing at the horizon waiting on rise time. At the instant of rise time, we would hear the satellite and get AOS. Nondirectional antennas could be used, but steerable antennas give longer pass times and better

results, and allow a greater level of understanding in where the satellite actually is in space.

The four to six picture segments per pass are printed out and glued together to make a large mosaic record of the pass. Occasionally, a later pass can be joined onto a previous pass so as to get a current picture of most of our continent. The false color option on WXSAT makes the printouts even better.

About halfway through the exercise, I listened to a schoolyard argument between some kids during recess. One was saying that he got a bad deal because he only got a "low EL" pass. The other agreed that he did get a better overhead pass but his "look angles" at "rise time" had him pointing right into the school auditorium with its tin roof. It seemed to me that these two had learned something and really knew what it was all about. They actually sounded like a couple of

*Continued on page 57*

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*That's right! It's better.*

*Radio operators can send high-speed CW with a speed key similar to the Vibroplex "Bug," but it's even easier when they use a keyer with self-completing dots and dashes.*

In a strict sense, a keyer is just the switch that is closed to turn on the transmitter, but usually it includes more: It generates dots and dashes. The keyer described generates a self-completing dot-space or dash-space sequence with the momentary closure of a key. Self-completing means that a momentary closure of the dot key generates a full dot-space sequence. A

momentary closure of the dash key generates a full dash-space sequence. That is, when a dot or dash is initiated it cannot be interrupted. The keyer requires an SPDT key: one contact to make dots and the other to make dashes.

The keyer uses two inexpensive CMOS gates: a CD4001, a quad dual-input NOR gate, and a CD4011, a quad dual-input NAND gate, and a MOSFET switch. A run-of-the-mill N-channel power MOSFET can key anything from a low-power QRP transmitter to a California kilowatt. I used a TO-220 style MOSFET to key a 15 kW commercial transmitter.

This keyer has speeds adjustable from about 25 words per minute (WPM) down to about 10 WPM. Of course, you can select any other speed range that suits your fancy by changing R2, R3, and R6, or C1, C2, and C3 in Fig. 2. The speed control gets pretty touchy at the slow end of the control range — that's why the range is limited to about 2:1. An audio taper or log taper pot will ease the problem of making small changes to the speed control voltage for obtaining slower speeds.

I suggest that for slow-speed operations the characters be sent at 10 or 15 words-per-minute, but with letters

spaced to suit the receiver's speed. When a friend of mine went to take the test, she couldn't handle 5-word-per-minute characters, so the VEC upped the speed to ten and she had no problems. At 15 WPM or so you begin to hear the sound pattern that represents a letter, not the dots and dashes that form the letter. At 5 WPM the characters are so slow that you don't hear a pattern. Or at least I don't.

This keyer can be built for less than \$10 and an evening's construction time. A printed circuit board is not necessary; point-to-point wiring or wire-wrap wire on perfboard is just as good. While I used wire-wrap sockets, it's certainly not required.

The keyer can run on a 9-volt transistor battery or four AAA 1.5-volt cells. A power MOSFET like the IRF630 can switch a final amplifier with 5 A of peak plate current and a cutoff voltage of 200 volts. The MOSFET needs a gate drive of less than 6 V, and the current is negligible. Battery drain is less than 0.1 mA.

The functional block diagram is shown in Fig. 1(a). The timing blocks are three monostable multivibrators: One mono sets the time for the dot, one for the dash, and the third one for

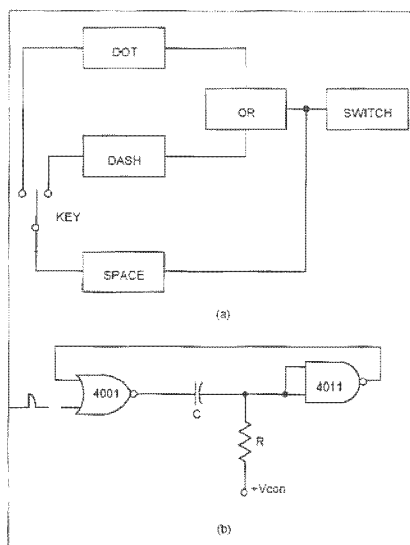


Fig. 1. (a) The keyer is built with monostable multivibrators. (b) The monostable multivibrator uses CMOS ICs.



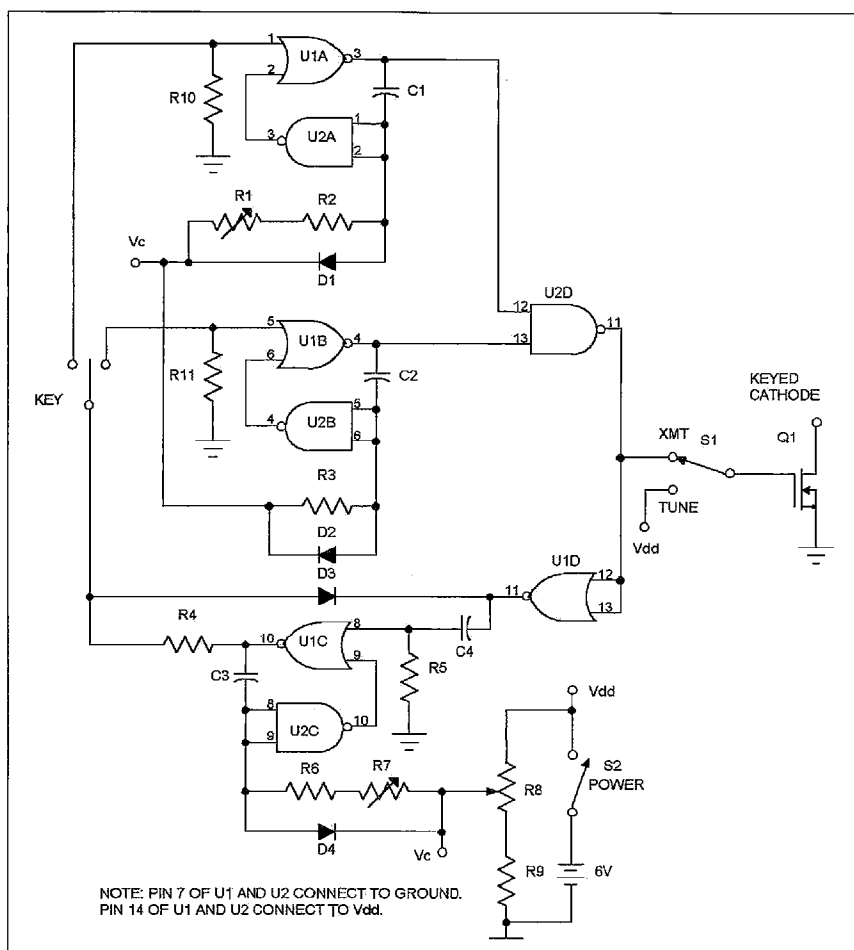


Fig. 2. The keyer uses 2 CMOS ICs and a MOSFET.

the space. The basic monostable multivibrator is shown in Fig. 1(b). Timing is set by the RC product and the control voltage, V<sub>c</sub>. The inverters used in the monos should all be in the same package so that the timing of the three will track as the control voltage is varied. The spec sheets for the CMOS shows worst case threshold voltage varying as much as  $\pm 10\%$ . However, when the gates are on the same chip, the thresholds track much better than 1%.

An N-channel power MOSFET is used as the keying switch. A common

garden variety power MOSFET like the IRF630 will do the job. For other MOSFETs, choose one with V<sub>DS</sub> greater than the tube's cut-off voltage and ID capable of carrying the tube's peak cathode current. For solid state transmitters, the voltage to be switched probably will be less than 24 volts and the current probably a few mils. This can be done with a small TO-92 MOSFET like Motorola's 2N7000.

The monostable multivibrator is built around the CD4001, a CMOS quad dual-input NOR gate, and an inverter. The inverter is actually a CD4011, a quad dual-input NAND gate, with both inputs tied together. The truth tables for the ICs is given in Table 1.

In the stable state, the inverter's input is V<sub>c</sub>. When V<sub>c</sub> is greater than the IC's threshold voltage,  $0.55V_{DD}$ , the inverter's output is zero. The inverter's low output is fed back to the NOR's

CD4001			CD4011		
A	B	C	A	B	C
0	0	1	0	0	1
0	1	0	0	1	1
1	0	0	1	0	1
1	1	0	1	1	0

Table 1. Truth tables.

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input. In the stable state both inputs to the NOR are low. In the timing state, the inverter's output is high and the NOR's output is low. The "high" fed back to the NOR's input keeps the NOR's output low after the trigger is removed. Subsequent triggers during the timing period then have no effect.

The multivibrator is triggered by a momentary high from the key. The arm of the key is high after the space following either a dot or a space and low during the space period and while the transmitter is "key down."

Taking the trigger input of the NOR gate above the threshold makes the output go low. This change in the NOR's output from  $V_{DD}$  to ground is coupled through the capacitor C to the inverter's input. The inverter's output then goes high to  $V_{DD}$ , and is fed back to the input of the NOR gate which holds the NOR output low. This condition prevails until the capacitor charges to  $V_{TH}$  through R at which time the inverter switches to its stable state.

The diodes from the inverter's input to  $V_c$  clamp the maximum input voltage to  $V_c$  and permits the inverter's input

voltage to return to  $V_c$  before the next trigger arrives. The diodes can be any small silicon diode — either the 1N4148 or 1N916 are good inexpensive choices.

The time required for the capacitor to charge to the threshold voltage is:

$$t = RC \times \ln(1 - V_{TH}/V_c)$$

where  $t$  is the time in seconds,  $\ln$  is the natural logarithm,  $V_{TH}$  is device threshold, and  $V_c$  is the speed control voltage.  $V_c$  must always be greater than  $V_{TH}$ .

If you're comfortable working with logarithms you can skip the next paragraph, but if a little refresher is needed, read on.

A logarithm is the exponent to which the base must be raised to yield the number. For example, the common logarithm is base 10 and is written as  $\log$ , but sometimes as  $\log_{10}$ . The  $\log 1000 = 3$ . That is, the base 10 must be raised to the 3rd power to produce 1000.  $10^3 = 1000$ . The base of the natural logarithm, denoted as epsilon  $e$  and written as  $\ln$ , is 2.71828. To convert from the base 10 to base  $e$ , multiply the common logarithm by 2.3026,  $\ln N = 2.3026 \times \log_{10} N$ . Most calculators have entries for both common logarithms and natural logarithms. Just in case yours doesn't, remember that you can convert from common to natural logarithms by multiplying the common log by 2.3026.

The period of the shortest time, the dot or space, occurs when the control voltage is  $V_{DD}$ . The shortest time determines the maximum keying speed.

The period of a space or dot can be calculated from the standard word "PARIS" which is made up of 43 spaces. 25 words-per-minute equates to 1075 spaces per minute or 17.9 spaces per second. The time of a 25 words-per-minute (WPM) space or dot is about

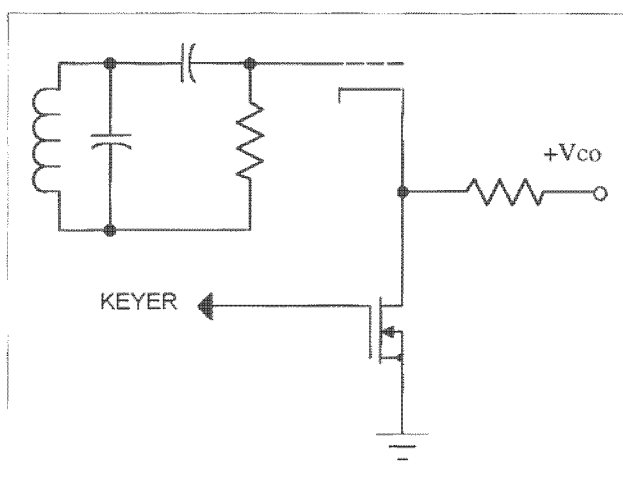


Fig. 3. A MOSFET can key the cathode of a vacuum tube amplifier.

$56 \times 10^{-3}$  seconds. Since the multivibrator's minimum period is  $0.69RC$ ,  $RC$  is about  $80 \times 10^{-3}$  seconds (0.1  $\mu F$  and 800k) for 25 WPM. If your normal highest operating speed is 15 WPM, the time of a space is  $93 \times 10^{-3}$  seconds and  $RC$  can be changed accordingly to about  $133 \times 10^{-3}$  (0.1  $\mu F$  and 1.3 megohms). The dot and space monos can use 0.1  $\mu F$  multilayer ceramic capacitors. For the dash mono, a 0.3  $\mu F$  is needed. Three 0.1  $\mu F$  in parallel are an economical choice, but a 0.33  $\mu F$  ceramic and an  $R$  of 720k works, too. The  $RC$  product is the important concern.

A positive-going input to the NOR gate from the key triggers the "key-down" mono, dot or dash, and starts the timing sequence. The negative outputs of the dot and dash NORs are combined in U2D, a NAND gate used as a negative input OR gate to produce a positive pulse to drive the N-channel MOSFET. From Table 1 it is seen that U2D's output will be high if either input is low. The output is low when both inputs are high — that is, when the monos are in their stable states.

The output of U2D is inverted in U1D whose output goes high when the key is "up" after either a dot or dash. The positive transition of the output of U1D is differentiated with C4 and R5 to trigger the space mono. The output of the inverter U1D also clamps the arm of the key to ground during key-down so that neither the dot nor the dash can be triggered until after the full sequence is completed.

Part No.	Value	Mfr. Part No.
C1, C2, C3a-c	0.1 $\mu F$ $\pm 10\%$	Kemet C320C104K5R5CA
C4	1,000 pF $\pm 10\%$	Kemet C315C102K5R5CA
D1-4	1N4148 or 1N914	
Q1	IRF630	or similar, see text
R1, R7	500k $\pm 20\%$	Piher PT15D-504
R2, R3, R6	680k $\pm 5\%$	RC07GF684J or equal
R4	20k $\pm 5\%$	RC07GF203J or equal
R5	100k $\pm 5\%$	RC07GF104J or equal
R8	50k $\pm 20\%$	Mouser 31CN405 or equal
R9	47k $\pm 5\%$	RC07GF47J or equal
R10, R11	1 meg $\pm 5\%$	RC07GF105J or equal
S1	SPDT	Mouser 633-M201201 or equal
S2	SPST	Mouser 633-M201101 or equal
U1	CD4001	Harris CD4001BE or equal
U2	CD4011	Harris CD4011BE or equal

Table 2. Parts list.



**Fig. 2** shows the schematic of the complete keyer. The component values are given in **Table 2**. The parts used are commonly available from any electronics distributor. Radio Shack Unlimited is one source and Mouser Electronics is another. **Fig. 4** shows the wiring of 14-pin headers that hold the passive components. Wire-wrap headers and sockets for the ICs make it convenient for wire-wrapping. Of course, sockets aren't really necessary, just convenient.

The period of a dash is the reference time. The dash period is ideally equal to the period of three dots or spaces. The trimmers R1 and R7 are adjusted to account for component tolerances and to make the three-to-one timing, or to change the weight of keying.

Adjusting the trimmers is a piece of cake: Connect an average-reading voltmeter from U2-11 to ground: Put the key in the dash position and adjust the space trimmer R7 so that the meter indicates exactly 25% of  $V_{DD}$ . The dash is "key-down,"  $V_{DD}$ , for three periods of time and "key-up," zero volts, for one period of time for a duty cycle of 25%.

Adjusting the dot trimmer is equally simple. Put the key in the dot position, and since the dot is ideally equal to a space, adjust the dot trimmer R1 to make the meter reading half of  $V_{DD}$ . That's it. The dot trimmer and space trimmer are set-and-forget.

It's a good idea to make the adjustments with the speed control set for the highest speed so that the meter doesn't try to follow the keying. While the adjustments described are for the ideal 1:1 dot-to-space ratio and 3:1 dash-to-space ratio, the keying weight can be changed by juggling the trimmers to suit your preference.

In passing, note that all digital DC multimeters do not necessarily indicate average. In that case, you'll need a low-pass RC filter between U2-10 and the meter. An R of 1 meg or more in series with the meter and a C of 0.1  $\mu$ F or more across the meter will smooth out the fluctuations and keep the meter reading steady. While the indicated voltage depends on the voltmeter's input resistance, the absolute indication is of no concern. The relative value of

"key-up" to "key-down" is what's important. The "Tune" switch keeps the key down to get the "key-down" voltage reading.

Adjusting the keying weights off the air with a code practice oscillator is considerate of others on the band. A code practice relaxation oscillator that can be gated with the keyer is shown in **Fig. 5**. The simple code practice oscillator shown is built around two sections of a CD4011 that are keyed with the output of the keyer U2-11. The oscillator is gated "on" when the input from U2-11 is "high" or "key-down." The frequency of oscillation is approximately  $1/(1.4RC)$ . For 700 Hz C is 0.01  $\mu$ F and R is 100k. The unused sections of the IC should be tied to ground or  $V_{DD}$ .

The edges of the oscillator waveform are very fast and can get into almost any AM radio, so that a separate audio amplifier won't be needed, use the radio to monitor your fist. If you want to use separate headphones, a

simple 2N3904 bipolar transistor operated as an emitter follower as shown in **Fig. 5** can easily drive them.

**Fig. 3** shows how the MOSFET can key a typical vacuum tube final amplifier. When keying a tube's cathode, the MOSFET will be switching a voltage in the range of a hundred volts. For safety's sake, the switch should be located near the tube to keep the high voltage away from the operator.

Since the temperature near the tube is probably high, some nominal heat sinking of the MOSFET switch may be needed. The dissipation in the MOSFET is  $I_{cath}^2 R_{DS(on)}$ . For most kilowatt transmitters, the final's peak cathode current is under 3 A and the MOSFET's drain/source voltage is under 2 volts, so the dissipation is a few watts.

Even though the duty cycle of CW is low the transistor's thermal time constant is short, so that the transistor's junction temperature follows the peak dissipation. In any event, the MOSFET

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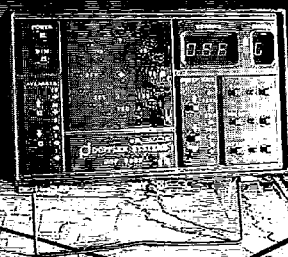
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case should be kept below finger-tolerable hot. Blisters aren't desired. A small heat sink should keep things in bounds. The temperature of the collector can safely be sensed (touched) when the key is down, but when the key is up, the transistor tab (drain) voltage is high. I feel more comfortable touching the transistor immediately after the transmitter HV is turned off and the HV shorted to ground with a gimp stick or shorting bar on the HV before reaching in to touch the transistor's tab. Grounding the HV is a smart move when touching the transistor's tab. The temperature of the tab won't change that much while the HV is being shorted.

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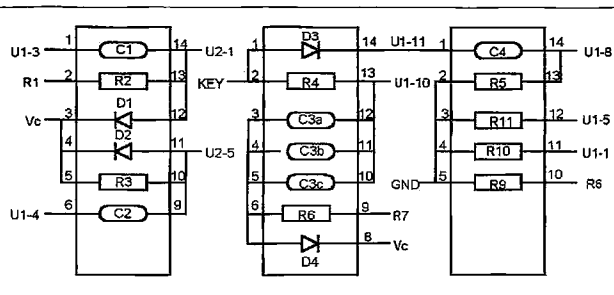


Fig. 4. The passive components can be mounted on three 14-pin headers for wire-wrapping.

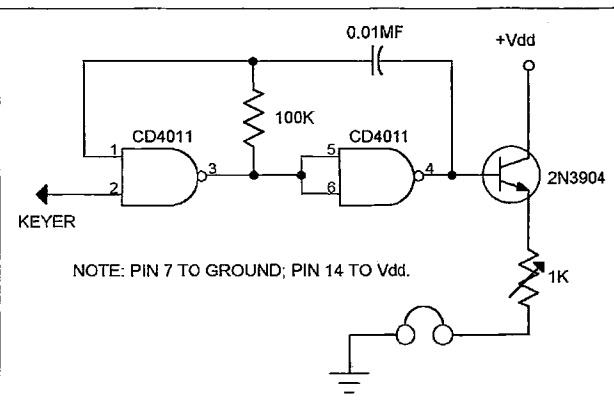


Fig. 5. A code practice oscillator can be built with a CMOS CD4011.

Keying a solid state amplifier doesn't require switching high voltages and the MOSFET switch can be located within the keyer. The power dissipation is a few milliwatts, so a small MOSFET like Motorola's MPF7000 is fine.

Adding a "Tune" switch S1 to keep the final on continuously while tuning can be accomplished with an SPDT switch that connects the gate of the MOSFET to  $V_{DD}$ .

When the keyer is enclosed in a minibox, the front has a "Speed" control potentiometer R8, an "On-Off" power switch S2, a "Tune" switch S1, and a jack or contacts for an external key.

This keyer can complement the CW fan's station without upsetting the budget or seriously detracting from operating time. The parts are available from Radio Shack Unlimited (RSU) at 1 (800) 843-7422, or Mouser Electronics, 958 Main St., Mansfield TX 76063, phone 1 (800) 346-6873. If you don't have their catalog, they'll be glad to send you one.

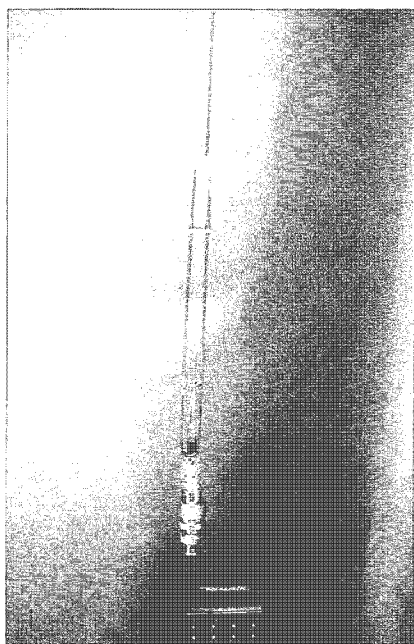


# Direct-Mount “J” Antenna for 440 MHz HTs

*If you're looking for better performance ...*

*The much-maligned rubber duck antenna is widely popular simply because it is a handy item and is adequate for working local area repeaters. In situations where you need more push in your signal, a “J” antenna is often the most practical solution.*

This usually requires the presence of a tree or some portable structure to support it. On the 440 MHz band, a simple and very effective answer to the problem is a “J” antenna that can be mounted directly on an HT, thus making the system as portable as the HT itself.



**Photo A.** The construction of the matching section portion of the antenna.

While not as small as a rubber duck, this antenna is not unduly cumbersome, and it gives substantial lift to the output of an HT. The overall length is about 24 inches. It weighs about 5 ounces. In fringe area operations, you can expect practical improvement over a rubber duck from poor or no copy at all to usable or maybe even solid copy.

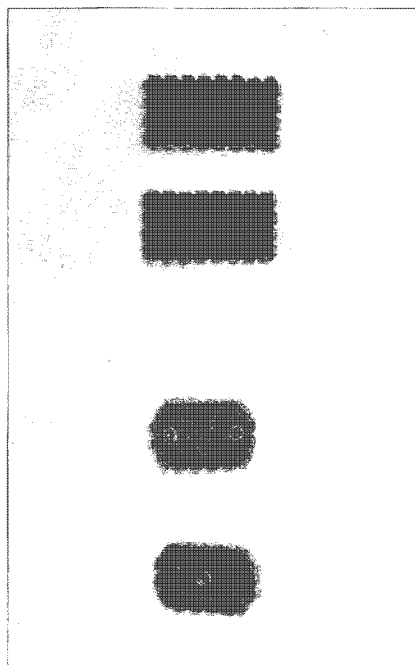
An AEA model SWR-121V/U Antenna Analyst was used to arrive at the dimensions and for the SWR and return loss data shown in **Table 1**. Return loss is a relatively recent concept in evaluating loss in antenna systems and is defined in the *ARRL Handbook 2001* (page 19.4) as the reciprocal of the reflection coefficient in dB. Since reflected power is always less than forward power, return loss is a negative value. Hence, the larger the return loss figure, the smaller the power loss. It would seem more logical to define return loss as the ratio of reflected power to forward power, expressed in dB. The standard formulas for SWR and decibels seem to confirm this. It will be noted that the dimensions of a “J” antenna do not always coincide with textbook formulas. The “J” antenna is a derivative of the old “Zepp” antenna, which used an open-wire transmission

line feeding the quarter-wave matching section. Everything was pretty much straightforward and copacetic — the balanced transmission line fed a quarter-wave matching section which was also balanced. The only departure from this consistency was in connecting the matching section to the antenna,

Freq.	SWR	Return MHz Loss, dB
439	1.5	-13.8
440	1.4	-15.1
441	1.3	-16.6
442	1.2	-20.0
443	1.1	-26.3
444	1.0	-50.0
445	1.0	-50.0
446	1.0	-50.0
447	1.0	-38.7
448	1.1	-26.3
449	1.1	-24.0
450	1.2	-18.2
451	1.3	-16.6
452	1.4	-15.1
453	1.5	-13.8

**Table 1.** SWR and return loss data for the direct-mount “J” antenna.





**Photo B.** The perfboard before and after snipping off the corners and ends so they will fit loosely inside the PVC pipe.

which was a half-wave wire connected to one side of the matching section. The other side of the matching section was left floating. Although no balanced-to-unbalanced transformer device was used, the antenna worked and served its intended purpose.

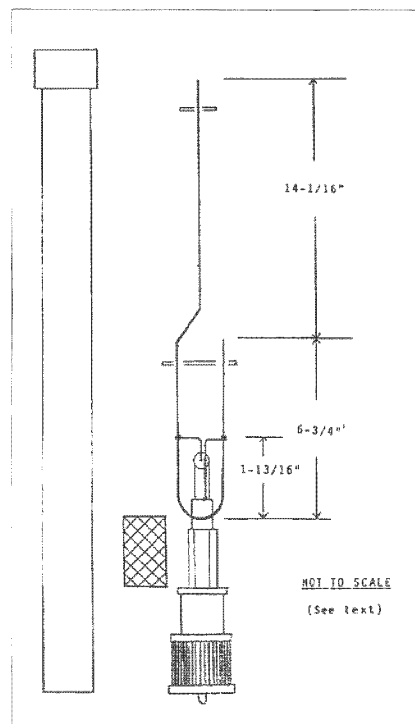
In "J" antennas, amateurs generally use coax, which is an unbalanced line, to feed the matching section which is a balanced quarter-wave line, and one side of this line is connected to an unbalanced load consisting of a single half-wave wire end fed. In some applications, such as this particular antenna, physical constraints do not permit using a balun to provide proper decoupling. The result is that common currents intermingle and neither the radiator nor the matching section, nor even the coax line, knows where the currents of one stop and the other begin. Consequently, the physical dimensions of the three elements of the system become interdependent. That being the case, varying combinations of dimensions will result in varying resonant frequencies with varying SWR bandwidths.

The antenna is made of no. 14 solid copper

thinwall PVC pipe with a weather-proof cap at the top and a PL-259 fitting at the bottom. The PL-259 plugs into an SO-239/BNC adapter (Radio Shack 278-120), which mounts directly onto a hand-held 440 MHz transceiver.

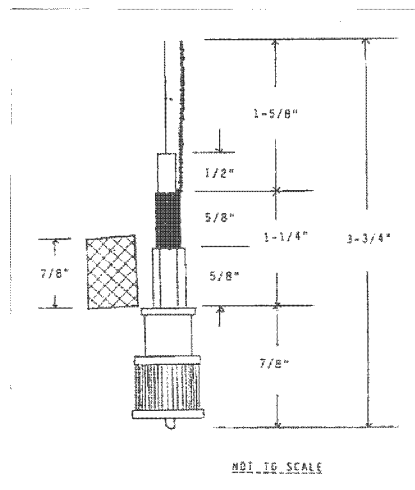
Spacers are used to keep the wire centered in the PVC; these are made by breaking off two  $3/8"$  x  $13/16"$  pieces of unclad perfboard. Each piece will have three holes by seven holes. The hole in the center will be enlarged on one piece for the radiating element. On the other piece, two holes, about  $13/32"$  apart, one on each side and equidistant from the center hole, will be enlarged for the matching stub. Use a  $1/16"$  drill to enlarge the holes in the spacers, pushing the drill back and forth a few times so that the #14 wire is a snug fit. Snip off the corners and then snip off the pointed ends of the spacers so they will fit very loosely inside the PVC pipe. No filing will be necessary unless you wish to smooth the rough edges.

Straighten a piece of #14 solid copper wire about 3 feet long, by hand, so that it is reasonably straight, and then clamp one end in a well anchored vise or some solid object. Then, with a hefty pair of pliers at the other end, give it a sharp tug, and that will finish the straightening. Make a U-bend about 7 inches or so from one end, by laying it across the shank of a  $5/16"$  drill bit. Use a pair of diagonals to cut the radiator leg about 2 ft. from the U-bend. Use a file to round and smoothen the ends of the wire to facilitate installing spacers. Before you make the other centering bends, push the spacers for the matching stub and the radiator element onto the wire. On the matching section, place its spacer about  $5-1/2"$  from the U-bend. On the radiator element, place its spacer about 19 inches from the U-bend. A snug fit is desirable so that the spacers will remain in a horizontal position on the wire and not flop around. After the spacers are in place, make the double bend in the radiator element for centering just above the matching section. Next, measure and cut the matching section and radiator lengths slightly longer than the dimensions shown in Fig. 1.



**Fig. 1.** Form the "J" of no. 14 solid copper

Fig. 3 shows the initial plot of an antenna with such random length elements, before doing any trimming. The radiator element was  $14-5/8"$  and the matching section length was  $7-1/8"$ . The feed point was  $1-13/16"$ . This information is given just in case someone may have an interest in the low end of the band. You can trim the elements later, very carefully and in small increments, to arrive at the desired resonant frequency.



**Fig. 2.** Coax assembly measurements. Use a soldering iron to melt the insulating material. Do not pull. (Drawing not to scale.)



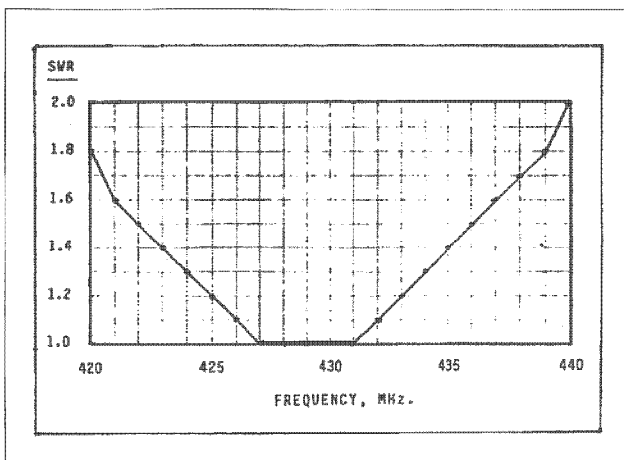


Fig. 3. Initial plot on an antenna, before trimming element lengths. See text.

The coax assembly consists of a short piece of RG-58 with a PL-259 connector attached (cut from one end of a Radio Shack #278-968), and a short piece of nylon-mesh-reinforced plastic tubing. This particular tubing is used for high-pressure lines and is sold at PVC supply stores. The inside diameter is about 1/4"; the outside diameter is a little over 7/16". In cutting and trimming the RG-58, be very careful with the knife and constantly watch for loose strands. Cut the coax at a point so that the overall length from the tip of the center pin to the cut is 3-3/4". This is the final dimension of the overall length of the PL-259/RG-58 coax assembly. Remove the black vinyl outer covering to a point 5/8" from the metal shank. Comb the braid out, straighten the strands, and twist them into a straight, round lead. Carefully remove the insulation on the center conductor to within 1/2" of the black

tubing over the braid and the center conductor leads, and push it tight against the metal shoulder on the PL-259. You may have to stretch the hole in the tubing by using a tapered rod, tool, or ballpoint pen so that the tubing will fit tight against the PL-259. Lay the U-bend of the matching section on the black vinyl that covers the coax, and butt the U-bend of the matching section against the end of the plastic tubing.

Watch carefully for any loose strands, and check spacing so there won't be unwanted shorts. Orient the coax so that the center conductor is vertically above the braid where it exits the plastic tubing. Bend the bare ends of the center conductor and the braid lead to form right angles about 3/16" from their ends, so they will touch the matching section feedpoints at right angles at exactly 1-13/16" above the bottom of the U-bend. Just a

spot-solder connection is advisable and adequate.

To ensure that the spacers will stay put in their respective positions on the #14 wire, use a toothpick and apply a small dab of clear silicone caulk onto the wire where it passes through the holes in the spacers.

vinyl. It is important that you use a soldering iron to melt the insulation material from the wire. If you try to strip and pull on the insulation this close to the PL-259 fitting, you run the very real risk of dislodging the center conductor from the pin on the PL-259. Slip the 7/8" piece of clear plastic

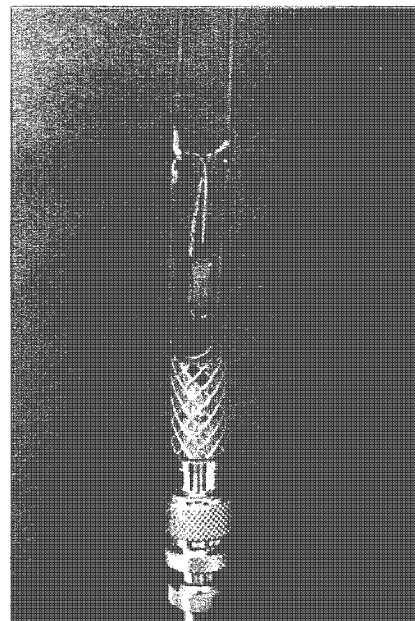


Photo C. The coax assembly, spot-soldered to the matching section.

The PVC goes over the knurled retaining collar on the PL-259 connector. In Fig. 1 the plastic tubing and the PVC pipe are shown alongside the antenna assembly for clarity. A Radio Shack #278-120 adapter finishes the construction. Depending upon the particular PVC pipe you use, it may or may not fit snugly onto the PL-259

Continued on page 57

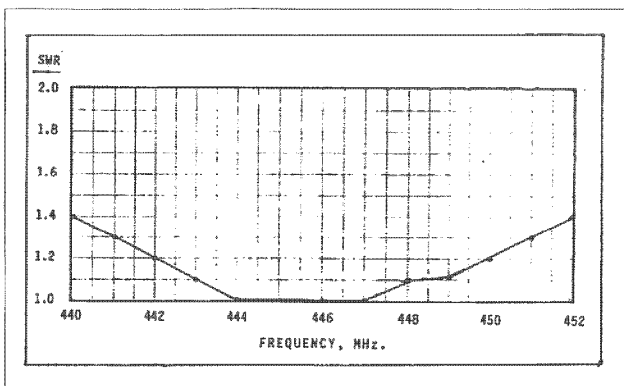


Fig. 4. Plot of SWR values in Table 1.

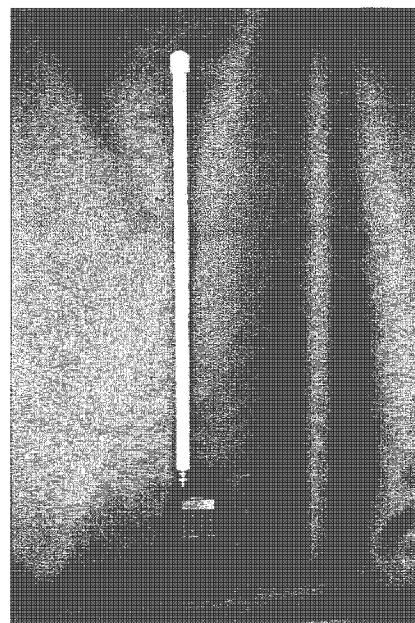


Photo D. The finished antenna mounted on the HT.



# New Life for a Pierson KE-93

Part 1 of 3.

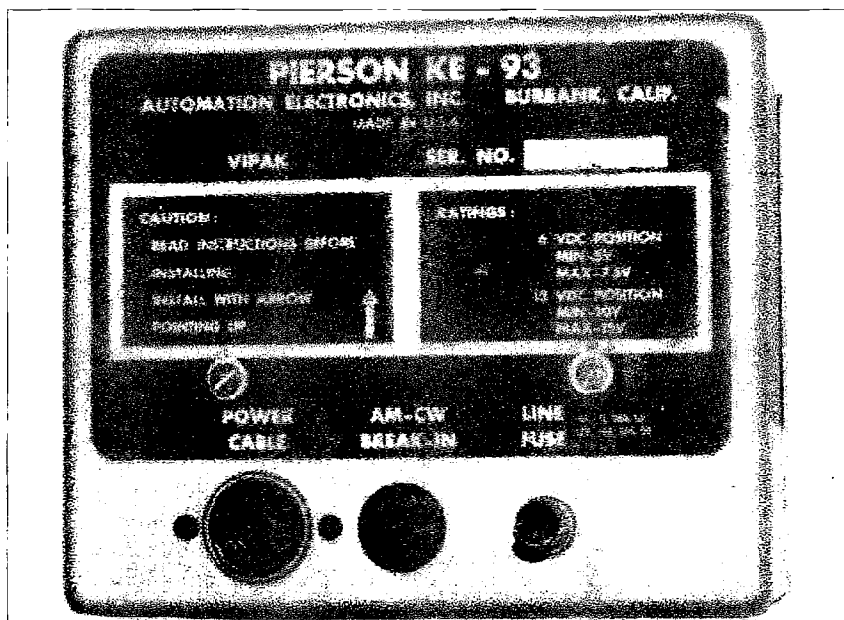
Once upon a time, there was a miniaturized multimode communications receiver developed for ham radio during the 1957 time period. It was called a KE-93, designed and built by Pierson in Burbank, California. This receiver had little competition in size and capability, and yet it sold for \$199 (power supplies were extra). This price was very competitive with those of other receivers within the field at the time.

**M**y friend, Johnny WB6HYR, loaned me his Pierson KE-93 to see what I could do with it since the receiver had been out of service for many years. As received by me, it was badly weathered and appeared to be an abandoned orphan. Having seen them years back, but not having worked with one, left me with

the feeling of “wanting to examine the beast.” Working with the Pierson has been quite an experience and one that I hadn’t anticipated at all. Since I am quite familiar with tubed receivers of the era, I really expected the Pierson to be comparable. What a surprise! It turned out to be BETTER than the run-of-the-mill 1950s-era communications

receivers. In fact, in running comparable tests on it versus the newer solid-state receivers, the Pierson performed at very close to the same parameters as the newer gear.

I had no information on the Pierson, so everything had to be “discovered” as I worked my way through it. In addition to the receiver, I also received

[illegible]

*Photo A. Front panel view of the "VIPAK" Pierson mobile power supply.*



the mobile and base power supplies that were sold as companion items. The biggest challenge for me was to develop as much information regarding the receiver as might be needed to gain an understanding of it as well as restore it to an operational state. I did locate one of the original published advertising pages for the Pierson and have included that here — shown in **Fig. 1**.

My approach to the restoration process was to open the power supplies and make sure they were operational since the base power supply, at least, would be required to operate the receiver. I drew up schematics for both power supplies as a starter and will share them during the discussion of the supplies. Drawing up a schematic for the receiver turned out to be nearly impossible because of the very compact nature of the physical design. I was able to obtain sufficient information to become comfortable with the knowledge obtained. What I learned about the receiver will be shared during the discussion of it.

Before starting into a discussion on the power supplies, let me say that anyone owning a Pierson KE-93 communications receiver is very fortunate. Yes, the receiver is worth its weight in performance. True, it uses “fire bottles” and it gets hot, but it still performs marvelously well for its age. Though I’m easily impressed, the performance of the receiver speaks for itself.

## Power supplies

I’ll open the discussion with the mobile power supply (see **Photos A, B, and C**) because it is available as part of the original equipment. However, it’s unlikely that anyone would use either the mobile supply or the receiver in a mobile application in today’s ham environment. Studying the mobile supply provides some insight into the design thinking that took place in the 1950s era.

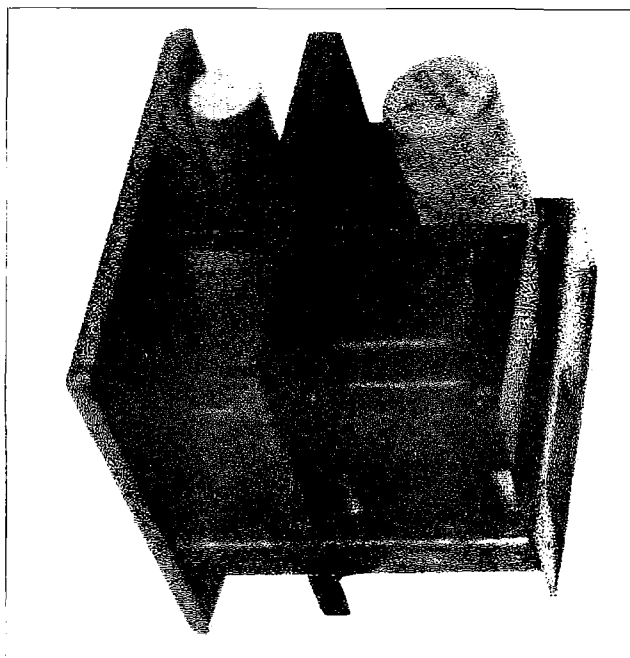
The schematic for the mobile power supply is shown in **Fig. 2**. Two rectification types were used in mobile power supplies during the period, with one type using a tube rectifier. The other type, as used in this supply, is a

synchronous vibrator which not only chops the applied DC power, but also has the second set of contacts synchronized to “rectify” the output, so to speak.

Judging from the design, I suspect the supply was designed as a universal type suitable for use with many applications. As designed, the supply’s flexibility allowed it to be used with either a positive or negative battery ground system in addition to operating on either a 6- or 12-volt system.

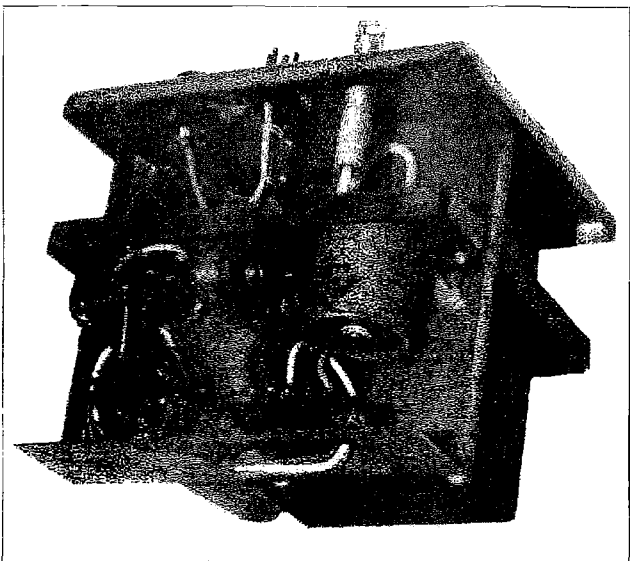
To increase the application flexibility, it appears that a built-in connector could be used to change the DC output voltage parameters as well. I didn’t investigate that possibility, however. For use with the Pierson, no connections or jumpers to the connector were required. For the Pierson KE-93 application, the supply configuration was accomplished through the two 6-pin Amphenol connectors mounted on the front panel.

The vibrator parameters are shown on the schematic for reference. Vibrators were available from two sources, James and Radiart, and they were interchangeable in this supply. Of interest is the fact that the vibrator operated at 115 Hertz to create a near square wave of AC power for the transformer primary. Sharp corners were developed by the vibrator



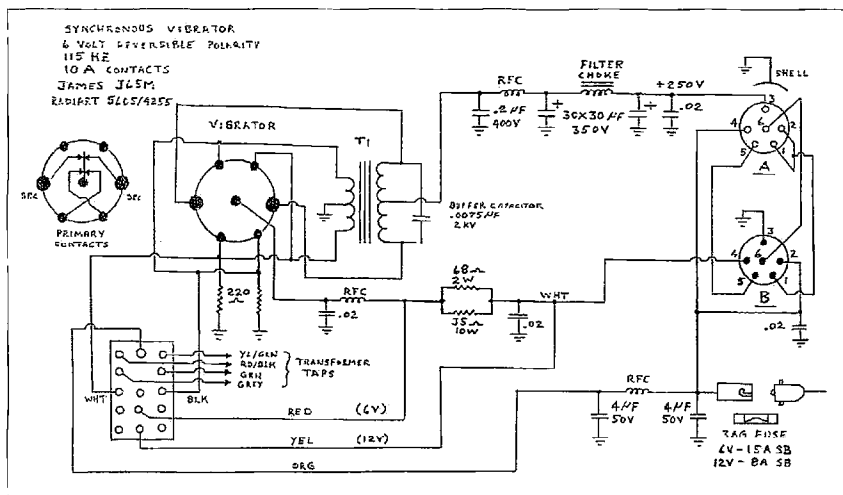
*Photo B. Inside top view of the mobile power supply.*

and appeared on the transformer’s secondary as spikes. A small value buffer capacitor was selected (similar to tuning) to reduce the overshoot, or spiking, condition. Voltage spiking is hard to filter, so smoothing it aided the output filtering process. In addition to reducing the spiking on the secondary, the buffer also reduced the sparking that occurred between the vibrator’s primary contacts. Contact arcing would destroy a vibrator in a short period of time, so making sure the buffer capacitor was



*Photo C. Inside bottom view of the mobile power supply.*





“tuned” properly was critical. Because of the noise created by the vibrator, extensive filtering was imperative to provide a nearly pure DC output for the receiver. Shielding was required to keep the emitted RF noise to a minimum.

### Base supply

The base power supply designed for use with the Pierson KE-93 is conventional, as shown in **Fig. 3** and **Photos D, E, and F**. AC power is transformed from 115VAC to 500V for the center-tapped HV secondary, 5V for the rectifier filament, and 6.3V for the receiver's tube heaters. With the receiver as a load, the B+ supply voltage

measures near 220V and is provided to the receiver through a power cable attached to the power supply. AC power and heater voltage is switched at the receiver through the power cable.

For ham applications, the receiver can be placed on standby during transmit through the connector mounted on the rear of the supply. Typically, transmit relay contacts were used to switch the HV center-tap to ground during receive. A switch mounted on the front panel of the power supply is used to perform the standby function manually.

Included within the base power supply is the speaker along with the "S"-meter and its control circuit. The meter

control circuit consists of a 6BJ6 tube used as a variable resistor in one leg of a bridge circuit. The meter will read zero when the bridge is balanced. The control grid (pin 1) of the tube is connected to the AVC circuit within the receiver. With an increase in incoming signal strength, the AVC voltage will swing in a negative direction, increasing the tube's resistance and causing the meter to swing up scale.

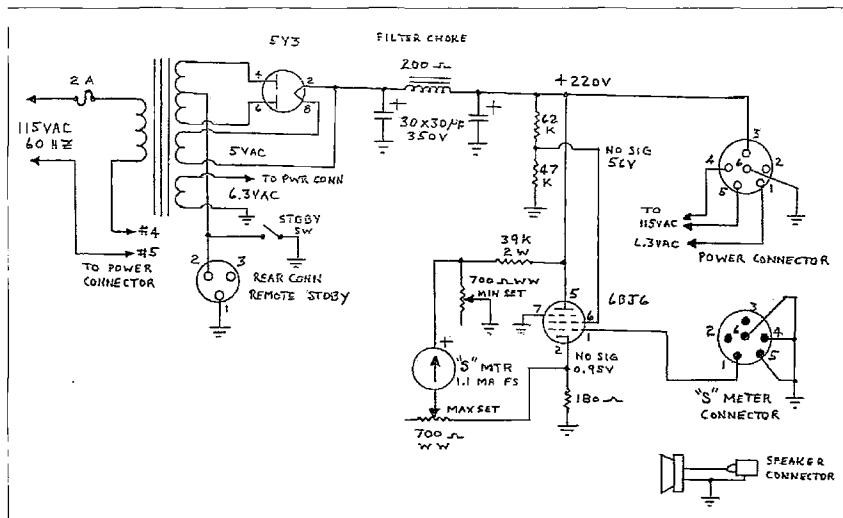
One of the things that I discovered with the Pierson was that the "S" meter responds quite accurately to the strength of an incoming signal that I provided from a calibrated signal generator. The meter rises one "S"-unit for each 6dB of signal voltage level increase. I checked the meter indication at both S-9 and 54dB over S-9 to see how well it tracked, and the meter indications did track.

While bringing up the power supply, the two wirewound calibration pots that set the meter limits were dirty, creating an intermittent meter operation. Rotating the pots back and forth slightly cleaned up the contacts and stabilized the meter. Of course, moving the pots upset the meter's calibration, so I had to repeat the S-9 and 54dB over S-9 calibration to restore the accuracy.

Before leaving the base power supply, let me describe briefly the process that I used to prepare the supply for the application of AC power. As I've always said, it's more than just a little scary to apply AC power to a supply that hasn't been powered up for several years.

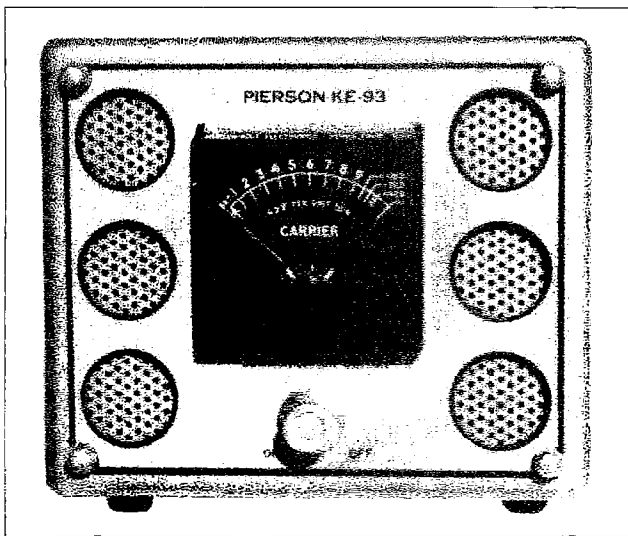
The one technique I've found that works nearly every time follows this simple procedure that is performed to protect the supply:

(1) Measure the DC resistance of the B+ line. A resistance value of 10k ohms or higher is desired. (a) If the resistance is higher than 10k, then the chances of damage occurring is minimal with the application of power. (b) If the resistance is lower than 10k, extreme care must be taken. The outlined procedure described here can be attempted, but monitoring is definitely required. Changing the filter capacitors may be a necessity if they fail to



**Fig. 3.** Schematic diagram for the KE-93 companion base power supply. A speaker and "S"-meter circuits are included within the supply.





**Photo D.** Front panel view of the Pierson base power supply. The "S"-meter and manual transmit standby switch are shown.

reform properly using the following procedure.

(2) Connect a HV DC voltmeter to the B+ line. Be sure the receiver is disconnected from the power supply during this procedure.

(3) Using a light bulb connected in series with the power line to the power supply to act as a "safe load," use a Variac to control the amount of AC voltage applied.

(4) Raise the line voltage in small increments until the voltmeter begins to show a value of about 50 volts for the Pierson supply.

(5) Without resetting the Variac, monitor the B+ voltage value while observing for any voltage change. As the filter capacitor's dielectric reforms,

at 250V for at least an hour before connecting the supply to the receiver.

(9) With the receiver attached and before applying full B+ voltage to it, monitor the B+ line voltage and raise the voltage slowly. The objective is to determine that the receiver is capable of handling the voltage without damage.

### Problems found

During the process of bringing up the power supply and the receiver, I ran across a number of problems. Each had to be resolved before the receiver was deemed "good" and ready to go. I'll list the items here and discuss them further as they apply to the subject.

(1) Power supply filter capacitors required reforming.

the voltage across the capacitor should rise.

(6) When the voltage stabilizes after a rise, increase the Variac to obtain another 50 volts and monitor the value for stabilization at some higher level.

(7) Continue the steps outlined in 4 through 6 until the B+ voltage value reaches about +250 volts for the Pierson supply.

(8) Allow the B+ voltage to remain

(2) Dirty and corroded plug connectors.

(3) The power switch attached to the volume control failed.

(4) Heaters of tubes V3 and V4 failed to light.

(5) Found a cut 2W resistor lead connected to the heater circuit of the VFO oscillator (V3).

(6) A cracked 12 $\mu$ F/25V electrolytic capacitor connected to V9's cathode.

(7) Dried out filter capacitor in the cathode of VI2.

(8) One 4.7k resistor had changed value to 9k ohms.

(9) The dial cord path was dirty causing the dial cord to jump track.

(10) Chassis was badly rusted.

(11) Exterior of the cabinet and dial face were dirty and partially corroded.

(12) The meter SET pots were dirty.

(13) The tuning capacitor and turret shaft bearings required lubrication.

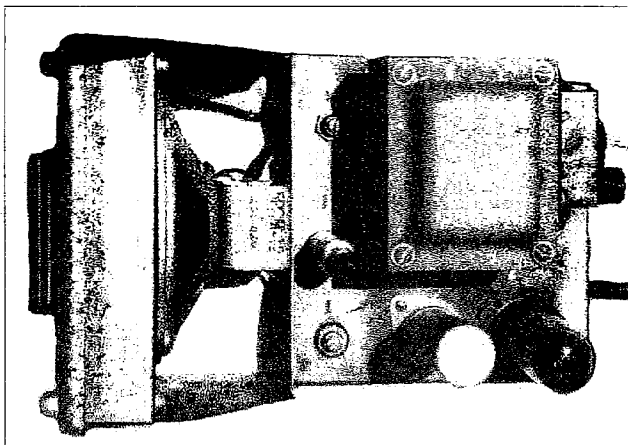
(14) All of the potentiometers were noisy/dirty and required cleaning.

### Comments

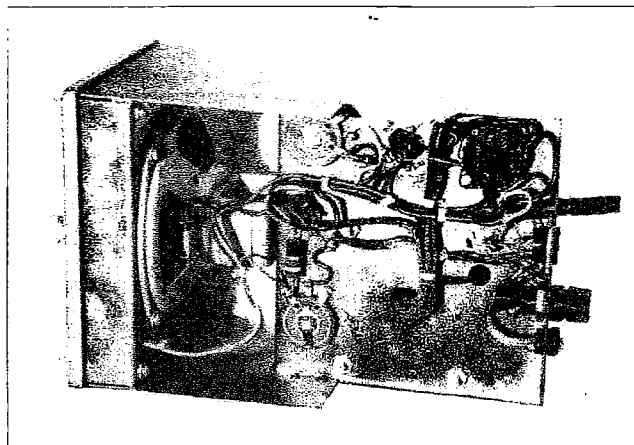
Starting with a piece of unknown equipment such as the Pierson KE-93, with its complexities, was quite an experience and challenge. Nearly every step toward restoration had to go through a "discovery" process where sufficient information could be developed to enhance an understanding of what was going on.

Part 2 of this series will continue with the problems encountered and preparing the receiver to operate.

73



**Photo E.** Inside top view of the base power supply. The two "S"-meter calibration pots are visible.



**Photo F.** Inside bottom view of the base power supply. Note the neatness of the assembly operation.

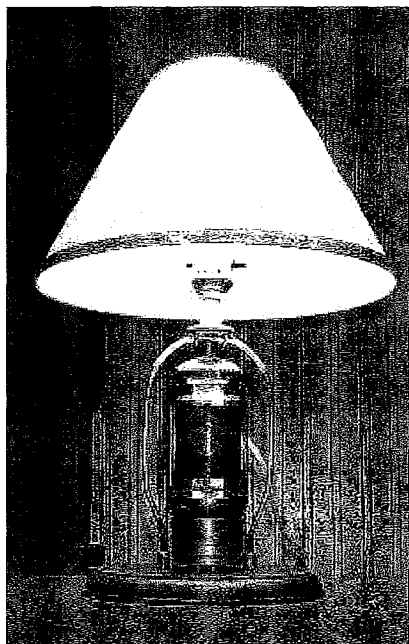


# Lamps from Tubes

*For fun and profit — and gifts!*

*I have always had a spot in my heart for tubes. You know that old saying, “Real radios glow in the dark.” I know that transistors are here to stay, but I do derive some pleasure from looking at a large tube, seeing the big graphite plates, and looking down from the top at the grid wires. Try doing that with a transistor.*

**M**y shack already had many of my favorite tubes mounted on nice pine wood bases. These were conversation pieces to say the least, especially with the younger set (which at my age seems to include everybody).

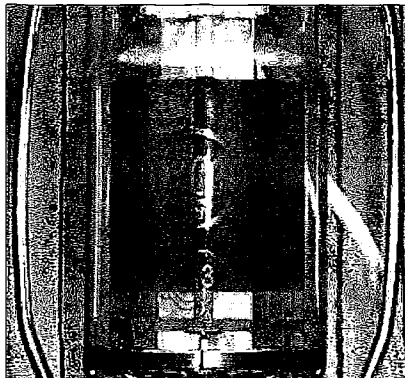


**Photo A.** My first lamp — and my favorite — is made from an 813 tube.

Walking through the electrical department at our local Home Depot, I spotted a “Make-A-Lamp Kit for Bottles,” and it dawned on me that I might have a better way of showing off those tubes sitting in my shack. I was going to make a lamp.

## Getting started

A Philadelphia company named Angelo distributed the kit that I started with. I wasn’t sure how I was going to do this, but at least I had a starting point. The kit came with the electrical fixture and line cord, as well as



**Photo B.** A beautiful RCA logo on my 813 tube.

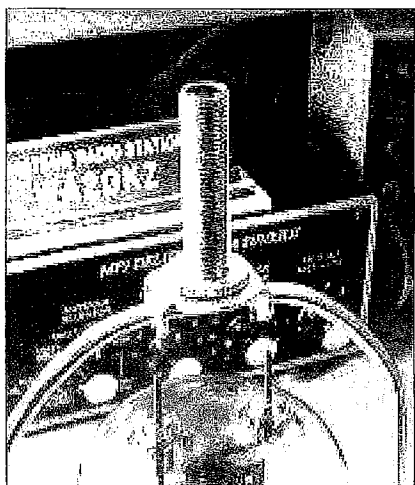
different-size rubber plugs that were supposed to hold the assembly in the bottle. Of course, I wasn’t going to use it this way, so I had to adapt things a bit.

The first lamp that I built used my 813 tube. I was already displaying this tube in the shack. If you look at **Photo B**, you will see that the tube has a



**Photo C.** The tube mounted on the base inside the harp.





**Photo D.** Solder the nut with the threaded pipe to the top of the harp.

beautiful RCA logo. The base of the tube has a unique serial number, and the date of manufacture was April 1941. With its heavy-duty construction and graphite plates, it was quite a conversation piece.

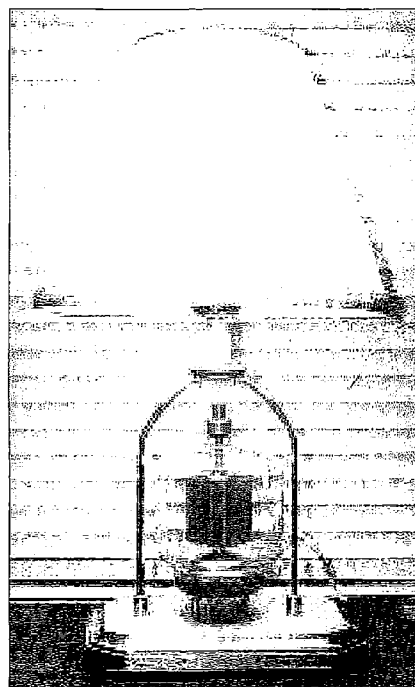
### Constructing the lamp

When I bought the lamp kit, I also purchased the metal frame that outlines the tube. In lamp circles, this frame is known as a harp. What I visualized was the tube inside the harp, and

somehow the light socket and shade above it. I drilled another two holes in the base about 1 inch from either side of the tube and pushed the ends of the harp into the wood. Looking at **Photo C**, you can see how the harp fits nicely around the tube. Each step brought me a little closer to my lamp!

I wasn't exactly sure of the best way to mount the light socket. In the light kit was a brass 1/8 IP thread locknut and a small piece of threaded pipe. I took a heavy-duty soldering iron and soldered the locknut to the top of the harp as shown in **Photo D**. The pipe connected the light fixture to the top of the harp. Next, I slipped one of the rubber plugs that came with the kit over the pipe to hide the exposed threads. Also included in the kit was a nice-looking gold piece with a hole in the center that was referred to as a check ring. It's a little larger than a quarter, and it fits nicely over the soldered nut on the top. I used the check ring to hide the soldering job on the nut.

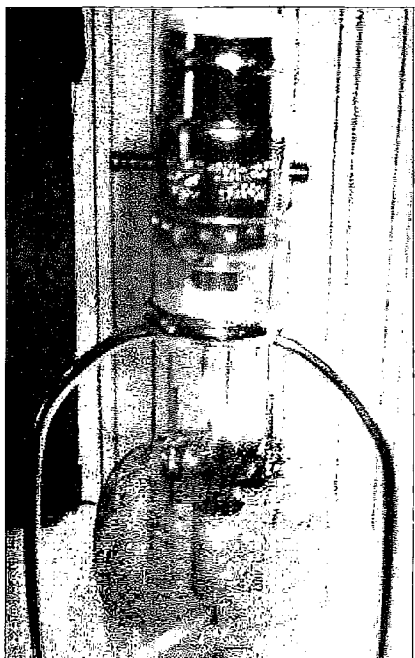
You could probably make the lamp by going into any good lamp department and just buying what you need. One of the things the lamp kit gives you is a light fixture with a small hole on the bottom for the line cord to pass through. If you just buy a regular light



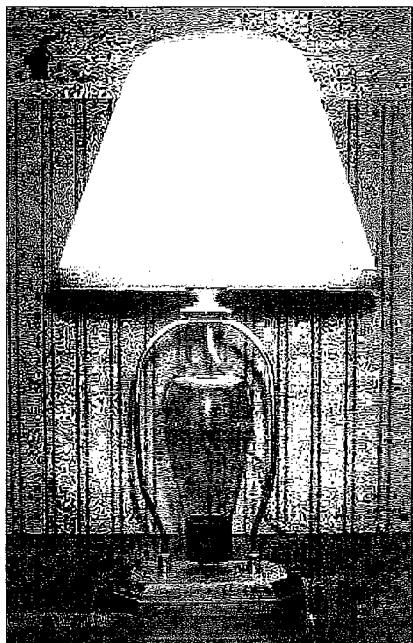
**Photo G.** Lamp made from a 3-500Z.

fixture, the wire passes out the bottom through the threaded insert, and in the case of a regular lamp it finally goes out the bottom of the base. If you don't buy the kit, you will have to drill a small hole and add a small rubber grommet. I found a large selection of

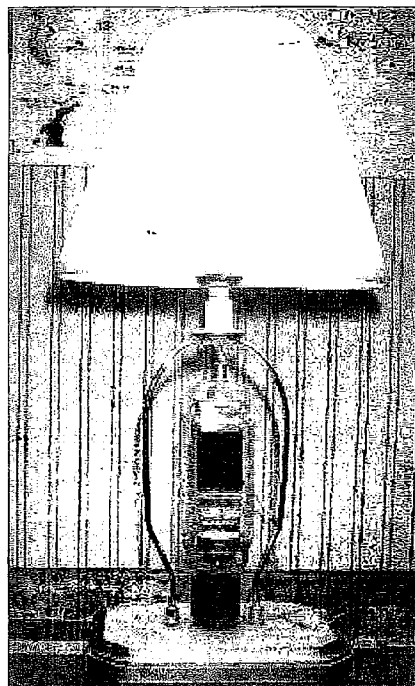
*Continued on page 30*



**Photo E.** The light fixture mounted to the harp.



**Photo F.** The completed lamp.



**Photo H.** Lamp made from an 814 tube.





Photo I. The author's shack is well lit in more ways than one.



Photo J. WA2OKZ.

## Lamps from Tubes

*continued from page 29*

Angelo kits and accessories at Home Depot and Ace Hardware.

Harps come in different sizes of lengths and widths — get the dimensions of the tube that you want to use before you go to buy the parts. I also bought extra brass locknuts because they were larger than the one that came with the kit and I thought it would be easier to solder it to the top of the harp.

To complete the lamp, a lampshade is needed. The type of shade you need is the one that clips over the light bulb. I bought mine at a local Target store for about seven dollars.

My shack has three lamps. The lamp in **Photo G** was made from a 3-500Z and was the most interesting. I had to cut the harp where it bends. The other lamp, in **Photo H**, was made from an 814 tube that also gives a neat appearance.

## Some helpful hints

When you are ready to mount your tube on a wooden base, visit your local craft shop. I got nice clean pine bases for anywhere from 50 cents to \$1.50.

When I was ready to drill the holes for the tube pins, I got a piece of carbon paper from one of the secretaries. I placed the tube on top of the carbon paper and gently pushed down, leaving nice marks where the pins were to go. I used an old piece of pine to drill out first so that I could get the diameter of the holes correct on the final piece.

Remember that you do not have to build your lamp exactly as I did. Take a chance if you see something a little different. You can't really lose anything. The parts are relatively cheap, and as long as you don't drop the tube, you can play all you want until you get the lamp to look the way you want.

## Hardware

As I said earlier, I found Angelo Brothers by accident. The company is located at 12401 McNulty Road, Philadelphia PA 19154. When I considered writing this article, I wanted to make sure that the parts would be available. I sent E-mail and inquired if they sold direct. I was told that if I wanted a local distributor, I should call (800) 999-2226. Their Web site is at [www.angelobrothers.com].

The kit that I purchased was their part number 70015, "Make-A-Lamp Kit for Bottles." The kit contains the on-off light socket with a line cord, a set of bottle adapters, which plug into the mouth of the bottle, a steel nipple, a locknut, and a check ring.

Part number 70220 is an 8-inch two-piece detachable lamp harp. I added a package of four brass locknuts, 1/8 IP thread. Angelo part number 70620, and an 8-piece assorted 1/8 IP threaded steel nipple, number 70150.

The bottle kit, the harp, a block of wood, a light bulb, the lampshade, and your favorite tube is all that you will need.

## What did it cost?

These lamps are all unique. If you have a collection of old tubes, you can make some nice gifts. The lamp kit is less than \$6, and the price of a harp about \$2.

Add some extra nuts and some extra threaded pipe and you're in the \$12 range. If you have to buy the base, we're talking of another \$1.50, tops. The most expensive single item was the lampshade at \$7. You should be able to keep the final cost under \$20.

I know that there are many talented people out there who will figure out a better way to make tube lamps, or maybe even a better way to display these relics of the past. When you finish your lamp, please E-mail me a picture.

I hope you have as much fun as I have had in building these lamps. They go together quickly. So even if you don't need more than one, you can give the rest away as gifts. 75

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# LOPs to Think About

*Come aboard for a great surplus find.*

*Navy CW started out with its own operating style and furniture. Quite a while ago, I was looking for an old U.S. Navy shipboard CW operating table to possibly add to my ham shack. Having been a Navy radioman for 20 years, I'd stacked lots of stuff on top of these old tables. I thought it would be practical for stacking equipment while still allowing me the freedom to operate below the equipment.*

Where to start? My first order of business was to research where one of these tables could be located. Since there are several Navy salvage yards around the world, it would not be easy to check the catalogs of each one every month until such a table appeared. The Internet provided no leads at all. The local library was no better.

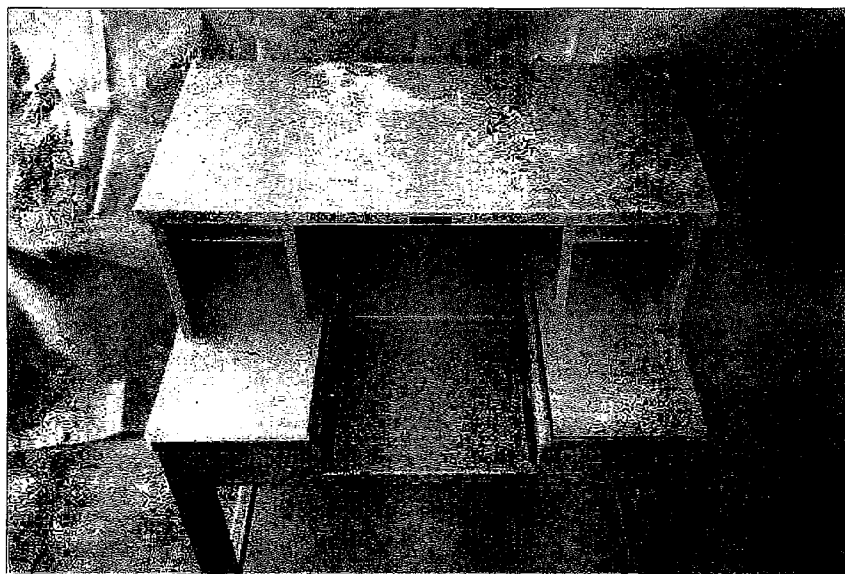
Next choice was *QST*. Yep, I sent in a Stray looking for information from anyone about such a table. The day before I received my *QST* in Nevada, my phone rang with the first touch of information. A ham in Maine called me to tell me he might be able to get a copy of the U.S. Navy blueprints for me so I could have one built. Wow, what a break! It seems he had been a shipyard worker there in Maine and knew exactly what I was talking about. Within a week, a copy of the plans arrived. The official Radio Operating Desk Plans are now in my ham shack.

Within a week of *QST* hitting the western states, my E-mail was flooded with all kinds of offers of information about this desk. Sailors or former sailors all over the country were sending me E-mail, cards, and letters. Some told me about their experiences during

various wars. Some sent pictures of Navy and Coast Guard operators either sending or copying code. It was like a floodgate had opened for about a month. The E-mail that topped it off came from San Diego, California. "I've got one of those LOPs (Local Operating Positions, as the Navy called them) that's been in my garage for 30 years. If you want it, come get it." Paydirt!

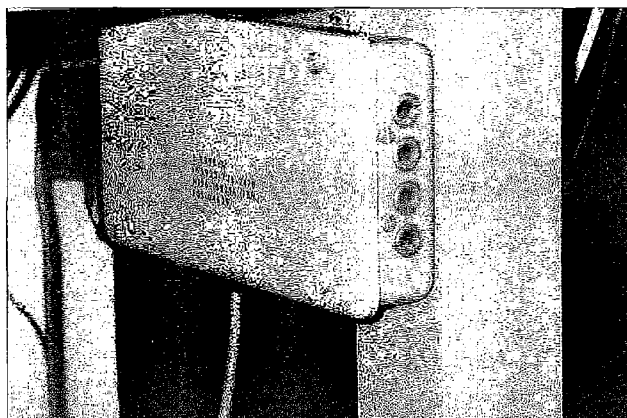
After a few E-mail exchanges, it was determined that this was exactly what I was looking for. In March 2000, I combined a business trip with a pickup of this great little desk.

The story, as I have it, goes like this. The desk was LOP #1 on the USS *Bunker Hill* CV-17, decommissioned in 1947. Apparently it had been acquired and moved to this garage to serve in his ham shack. Others I've



*Photo A. This is the condition the table was in upon arrival at its new home.*





**Photo B.** The headphone jack box is located on the right table leg.

talked with tell me that this ship, although decommissioned, had been used as a test bed for various projects in San Diego for many years.

Nonetheless, the table ends up in my trailer and heads up interstate 15 to Las Vegas, Nevada, and its new home.

First stop is in the garage for clean-up and possibly to be refurbished. Seeing how it had been in a seaside community garage for 30 years, it had obvious green stuff growing on the drawer handles, and the paint on top

desert obviously doesn't have a Navy supply store anywhere handy and I wanted to make sure the paint was exactly the same color. The solution was a simple trip to the local hardware store with one of the small shelves from the desk for them to match. They put the shelf under the spectrograph and within minutes we had a match.

Let's see, we have the desk, paint, electric drill with wire brush, spray painter, multimeter, paint remover, roll of plastic dropcloth, screwdriver,

would need to be replaced. The green linoleum, used for the desktop, needed to be cleaned or replaced, as it had tape residue and was covered with years of use. The wiring had to be checked and tested.

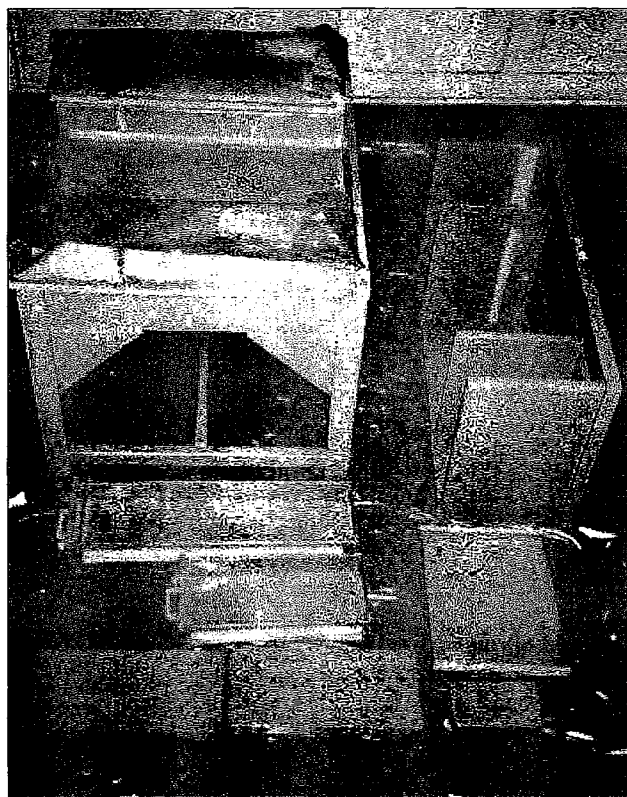
First I had to match the paint as closely to the original as possible. The Nevada

wrench, Pine Sol®, brown paper with masking tape, and a garage to hold it all during the project.

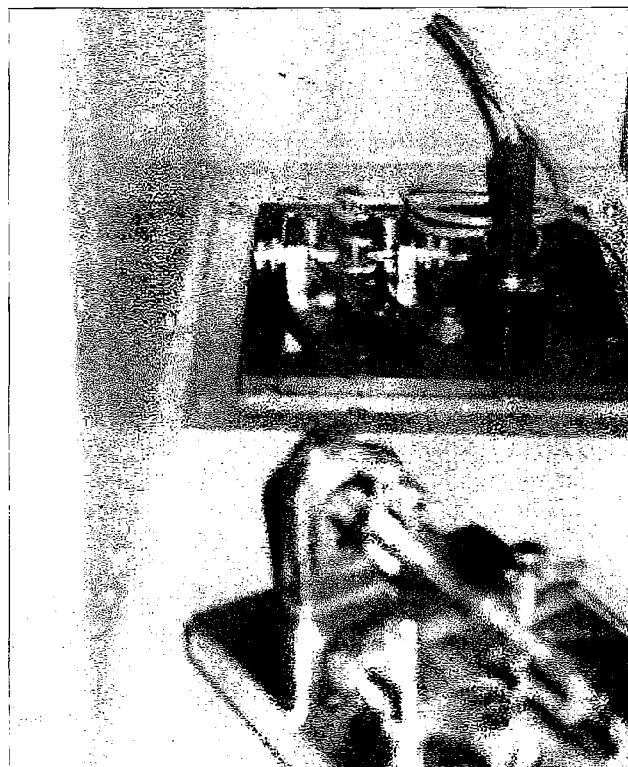
Next step is to clean it up to see what we are working with. Pine Sol the entire desk. Second, remove the top section from the desktop. With the two pieces separated, it will be easier to work with.

Working with the top section only, it was a matter of cleaning and scraping loose paint off. From the picture, **Photo A**, you can see the top has already lost some of its paint over the years. Having removed all the easy stuff, it was time for the paint remover for the very top shelf only. All the paint on the sides and supporting walls was left alone. Taking the top down to bare metal, prepping it, and then repainting it only took a couple of days. I painted the top section except for the back, which was in perfect condition (so I left it alone).

The lower desk portion looked like it was going to be a real job. The right side linoleum had some of the old cellulose tape remains imbedded into it. What to use? Well, when in doubt start with full strength Pine Sol and elbow



**Photo C.** Table unassembled, taped, papered, and ready for painting.



**Photo D.** Reinstalled Bakelite control panel with USS Mississinewa straight key and bug plugged in.



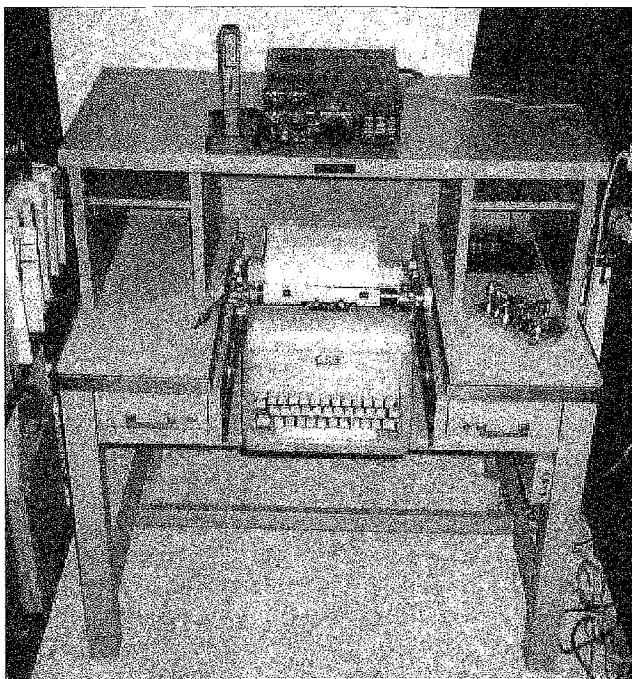


Photo E. Finished table with equipment installed in the radio shack.

grease. Hey, what do you know? It worked. Both sides were cleaned the same way. Sometimes the tougher stains had to have the Pine Sol on them for 30 minutes or so, but it worked.

The handles of the drawers, being a nice moldy green color, were simply wire brushed using the electric drill with an adapter. The green flew off the handles. Inside the drawers was just a matter of scraping paint to smooth out previous scratches. Original models had an ashtray built into the left drawer. This drawer did not have one. I believe it was there originally. This desk, being from an aircraft carrier, also did not have the eyebolts for the strap on the legs. The strap was used to hold the operator's chair in place. It went from one leg, behind the chair and back to the leg on the other side. During high seas this kept the operator in front of the desk. The strap was a required item on destroyers and other ships accustomed to rocking and rolling at sea. The only other option was for the operators to wrap their legs around the legs of the desk to keep from moving.

After all the prep work was done, it was time to paint. As shown in **Photo C**, you can see paper and masking tape in place, dropcloth under every piece

key when not in use. Clean the Bakelite with good ol' Pine Sol. Use contact cleaner to shine up the electrical working parts and the speed key jack. Headphone jacks mounted on the leg of the desk (**Photo B**), worked perfectly. Interesting to note: Upon opening the headphone jack box the insides looked brand-new. The only addition to the wiring was a plug to fit into the back of the radio speaker jack. It was necessary to replace the straight key that was not the original, with a key from the USS *Mississinewa*, AO-144. In 1970, while I served on the USS *Mississinewa*, the CW desks in radio two, the transmitter room, were being removed and thrown over the side into the Mediterranean. The First Class Radioman in charge of the project asked me if I wanted the key. Of course I did. I was going to get my ham license someday. Now the key has a good home.

After finishing the painting and wiring, I moved the two pieces of the desk to an upstairs ham shack. The desk was too large to fit through the door in one piece. We had to turn the bottom section on its side to fit through the door. Once inside the shack, it was re-assembled using all necessary hardware (**Photo E**). The miracle came

of equipment, spray gun in hand. Paint on the first coat was finished in 30 minutes. Then, next day, another 30 minutes of painting and it was nearly completed.

The Bakelite electrical panel/key mount (**Photo D**), which was removed prior to painting, was verified to be in working order, with the exception of the On/Off switch. This was not required, so it was not rewired. It was used to remove high voltages from the

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when every nut, bolt, and screw was back in place, with no extras and no holes left unfilled.

You'll note only one radio in the picture at this time. That is because it was the only gray radio in the shack. The bug in the picture is from 1979 and has not seen naval service. I also use a 1964 Champion the Navy gave me, complete with Navy stock number imprinted on the base.

The typewriter is a communication mill, all capital letters. It was acquired using the same research method. A Stray in *QST* produced another flood of E-mail, letters, and cards. I had mills offered to me for fair amounts of money all the way down to this one — free, just pay the shipping from Florida. To my surprise, this Royal is the same model I used on active duty in the '60s aboard ship. It is sitting on a sliding shelf. This sliding shelf allows the operator to pull it to him for ease of use, or push it all the way to the back. With the mill pushed all the way to the back, the operator could pull

down a folded cover to make a small, flat desktop in the front. I do not have this cover, yet. The slots that hold the shelf needed to be cleaned out and sprayed with a light lubricant. To keep the mill shelf from coming completely out of the table, there are two lever locks located 6-1/2 inches in from the front edge on either side that contact the stops mounted on the rear of the shelf.

Although this desk is over 50 years old, it came back to life very easily. There is one other type of CW table used by the Navy that allows the mill to disappear into a well area, giving the operator a flat desktop working surface all the way to the back of table. Other changes to today's table are that the top section is not installed and the key is a covered, explosion-proof design. This type was still in use in the Navy as of 1988, when I left the service. Either table would make a nice addition to the ham shack.

This unit is of aluminum, but you could construct one of wood also.

Aluminum was used to keep the weight down and because it is a non-burnable substance.

The idea of mounting the headphone jacks on the leg of the table is more convenient than having a cable running across the top of the desk you are using to copy code. Yes, it works well for listening to SSB nets, and copying traffic as well. Using multiple jacks allows for friends to listen in without disturbing the rest of the nonhams in the house. A multijack box is a good idea for Field Day when using another person for logging.

The key being mounted in the cubbyhole allows the operator to have the entire forearm on the desktop to reduce fatigue. It proved to be useful on SKN 2000. There is enough room to slide the bug into the cubbyhole but the forearm is not complete up on the desktop. Bug operators are not as concerned with the glass arm complex.

This has been one of those projects

*Continued on page 57*

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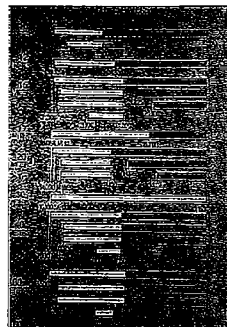
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# The Saga of Archie and Tillie

... otherwise known as Elmer.

*As do many of us, I sometimes reach back into my past to reminisce about events having significant meaning in my life. Often I've thought of the man and woman who gave to me the opportunity to begin my lifelong career. Archie and Tillie were my "Elmers," though I didn't know that at the time.*

Let me tell you of how my life was affected by my "Elmers," and then imagine for yourself how your assisting future amateurs could begin endless adventures for them.

In the late 1950s, a teenager's life in a rural community wasn't exactly filled with available technical opportunity. Or if it was, I sure didn't know that it was out there! One of the most intriguing events for me during those years was a visit to my grandparents' house, and that upright Philco in the living room. I would spend hours listening to stations from "who knows where," daydreaming all the time of what it was like to be able to understand what all those noises meant.

The summer of 1957 arrived, school had been successfully accomplished for one more year, and the lazy days of summer were the order of the day. But not for long!

Up the road from our place is a small summer camp that was commonly referred to as "The German Camp." Nobody paid them much mind: They were quiet folk, remaining very much apart from the happenings in our community. The only noticeable event happening with the lodge was the rattling

of the lodge station wagon delivering passengers from the train station on Saturday morning to the lodge, and returning them to the station on Sunday evening. When I asked my parents about these people, they informed me that they were "city folk" looking for some relaxation, and that I was to "leave them alone."

Needless to say, this guidance, while being "heard," wasn't a complete explanation of the question! Once, while walking past the place, the people outside were relaxing and chatting, but I couldn't understand what they were saying. The German language wasn't spoken in our household.

Family visits to the grandparents on a weekend evening were often a memorable occasion. The living room held great fascination for me, and the upright allband radio there intrigued me for hours. I would sit and listen to strange signals emanating from the speaker, wondering what magic created them, where it came from and what it meant. This would go on until the adults decided that they had heard enough noise, and that the unit would have to be "silenced."

Rats!

Passing the lodge one summer's day, I again heard the sounds of radio communication from one of the buildings. Antennas were strung through the trees, with coax leading into the building. The door was propped open, allowing the summer heat to escape and thereby letting the sounds be heard outside.

It was more than an inquisitive teen could endure. Summoning inner courage and ignoring the instructions of my parents, I approached the "forbidden" and knocked at the open door.

"Ja, may I help you?" came the reply from within.

Words "stuck" in my throat, but I managed to say, "I want to see your radio, please."

And with that a friendship was begun which has lasted for years. I introduced myself, told about the radio at my grandparents, and how there wasn't anything like that around here for my interests.

Archie proceeded to show me his vintage converted wartime radio, now operating on "ham" frequencies. He questioned me about what I had wanted of him, and what I thought I would like to do in the future. I'm sure



he knew all along what the "lure" of signals and glowing tubes meant to a "budding" mind, but he was patiently setting the stage for my entry into the world of electronics.

"Ja, I gif to you von hour on Saturdays, ven I em here. You sveep my valk, shovel snow ven vinter comes," he stated with his German accent. "You study hard! No fool around. Ven you are ready, I gif to you the test. Ven you haf ticket, you promise to teach others who come along. Ja, is good?" he spoke very seriously.

I could hardly believe my ears! I'm going to be a radio amateur, with a license and everything! WOW!

I promised to teach when I was able, not fully understanding what that commitment would require, but at that time I would have agreed to almost anything.

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Archie was writing a copy of the Morse code for me on paper as my first lesson, when his wife Matilda (Tillie), appeared from the main house. Archie introduced us and explained to Tillie why I was there. Tillie smiled, wished me welcome to their weekend home, and wished me luck in my studies.

The days of the week passed slowly while I studied the code and other material Archie had given me. Days were far too long, waiting for the "toot" of the horn from the ancient station wagon passing our house. That was the signal that Archie and Tillie had once again arrived for the weekend.

Finally, the day of reckoning had arrived! Those were the days when the Novice exam was given by mail — provided of course, that you could find an amateur willing to send for the materials and administer the test. The examination papers had arrived. I presented myself to Archie to test whether the time had been well spent or not. I need not have worried!

It took weeks for the Bureau to process applications. I had almost forgotten (yeah, right!), almost given up hope for a passing score, when my mother called to me from the kitchen.

"You've got a letter here. It's from the FCC," she said.

With trembling fingers I opened the small white envelope. Not knowing exactly what to expect, I read the document over and over again.

"Hey, I passed!" I exclaimed.

My Novice call was KN2UZP, good for one year, 75 watts maximum, etc., etc. I was elated beyond belief! I didn't have a radio, nor antenna, nor money to buy one, but I was a "ham"!

Since that wonderful day much has happened in my life because an old man and his wife gave of themselves to an inquisitive teenager. Shortly after gaining my "ticket," Dad was ordained into the ministry. This required that we move to another town. The promise I had made lingered with me as we settled into our new community.

As with many a young man, with the completion of schooling, I elected to "join the Navy and see the world." I just had to see what the world had to offer. And wouldn't you know it, one

of the tests given at basic training was Morse code! It was a breeze to pass that one! And with Amateur Radio Operator's License listed on the background forms, doors opened to a field called "Cryptologic Technician." I hadn't any idea what that was, but then neither did the person assigning me to the schooling!

As it turned out, four years of Secret stuff being a Radio Operator was terrific! Still wondering what the world was all about, I enlisted in the Air Force. The offer of a yearlong school for Basic Electronics through Advanced Circuitry was hard to dismiss. My amateur license, together with "crypto" experience (which they couldn't equate to anything) ensured my selection.

Twenty years of military service later, I finally retired. Not wanting to be unemployed, I applied for work with "Ma Bell." Yes, they had a position for me, but the starting pay would have to be increased, considering all your training and all!

More money! Oh, well, if I have to take it, I guess I will.

That lasted for 17 more years, until the offer was made for early retirement. Now I work at West Point, the U.S. Military Academy, where I repair equipment used for cadet training.

The promise made to Archie hasn't been forgotten. Now I perform VE services at testing sessions, give demos of homebrew QRP gear, help new hams to get their "kit" projects up and running, etc. Whenever I'm asked for assistance, I hear Archie's voice saying:

"Ja, you teach all who come along, remember."

Yes Archie, I haven't forgotten. And so I teach. Some are young minds, filled with awe; some are not so young, looking for inspiration and challenge. Never mind — they all receive the same "hour" given to me so long ago.

Thanks, Archie K2ANB (SK)! Thanks, Tillie K2AUM (SK)! Without your help, who can tell where the minister's kid would have gone? Thanks for a wonderful start on a life's adventure.

Got an Elmer or two you'd like to thank? Let us know at 73. — Ed. 73



# QRP Internet Computing

*Fast, powerful, secure ...*

*For the last 20 years, ham radio, personal computers, and the Internet have been running along parallel circuits that sometimes miss or forget important connections.*

What's been overlooked, or forgotten, is that it doesn't take a high-powered, Microsoft-Windows-based computer to easily and speedily access today's Internet, E-mail, and World Wide Web with its wealth of information for the ham community. Any older DOS-based 8088, 286, 386, or 486 computer will do it all — and very quickly.

For example, I'm writing this with a 1984 Compaq portable, running an 8088 CPU at 4.7 MHz, and an ASCII text editor of only 3116 bytes. It has 256Kb of memory, no hard drive, two low-density 5.25-inch 360Kb floppy drives, and an internal 2400 baud modem. It's operating from one floppy containing system files of MS-DOS 3.3, the little editor, and a dial-up communications program.

When I finish the story, I will use this machine to log on the Internet, check my E-mail, visit some regular Web sites, and then E-mail this story to 73 magazine. It's "QRP Computing" at its best.

To put your old DOS computer back on-line, find an independent Internet Service Provider (ISP) who is able and willing to provide you with a UNIX or

LINUX "shell" account. Shell accounts are a legacy of the early Internet and the 32-year-old UNIX operating system. LINUX, developed in 1991, is a PC and MAC clone of UNIX. LINUX's recent popularity as an Internet server almost guarantees that your local community has an ISP willing to set you up.

Using a shell account is like dialing into a BBS of the 1980s, where you use the keyboard not the mouse. You need to brush up on, or learn, some elementary DOS and a few simple LINUX commands to earn your way to an Internet ticket for that old computer you were about to trash.

The benefits are significant.

By dialing into a shell account, any computer becomes a remote terminal to the LINUX server, and isn't directly connected, or vulnerable, to the Internet. This means you're protected from direct attack by computer viruses. That applies to "cookies" and other hidden "temporary Internet files" as well, since they never reach your computer — only the server — which automatically deletes them when you log off.

A LINUX server between you and

the Internet is a formidable privacy and security firewall. However, when you download files or programs to your own computer, you need to take the usual security precautions.

One of the best things about a LINUX or UNIX shell account for the Internet is that it's all text, with no intruding graphics or advertising banners popping up during your on-line session.

The text-only Internet is very fast. For hams looking up on-line callsign information, or accessing the ARRL, QRZ, or other amateur radio Web sites, the World Wide Web's graphics often just get in the way of the essential information you're seeking.

This 17-year old Compaq is often faster at retrieving text information from most Web sites than my friend's Pentium 300MHz machine with a 56Kb modem pushing graphics through Windows 95 via America Online. Once connected to an ISP's LINUX server, performance primarily depends on the speed of your modem — not CPU. However, most people can't read text faster than just what a 2400

*Continued on page 58*



# Inkjet QSLs the Easy Way

*Basic techniques for basic cards.*

*Ham radio is not just a hobby, but more like a whole collection of hobbies. This means that when one part of the hobby loses a little of its novelty, you can play with a different area. Tired of chatting on the local repeater? Maybe you should work a contest or two, or maybe build some accessories to make life easier in the shack.*

In my case, for example, since I tend to concentrate most of my hobby time on public service and disaster communications, chasing DX is not my most common area of involvement. I do enjoy spending time on the low bands, but other duties, kids, etc., compete for the available

time. When I do find the time, though, I enjoy it greatly, but often have a slight problem with a lack of QSL cards even though I do believe that a QSL card is the final courtesy of a good operator. Add to that the fact that my day jobs have involved frequent moves and it should be no surprise that

I do not always have up-to-date QSL cards available. Although over the years I have used my share of stock cards, I admit I prefer to have something just a little different. I have made various efforts to design my own card, although being artistically challenged it takes more than a bit of effort.




When I've had to move or there has been some other change, I've tried to save a few bucks and use up my stock of existing cards by placing stickers over the incorrect information. This is less than optimal, especially for someone like me who has kept his old call and has cards with a /5 and /4 to indicate my (current) home QTH. I hate the idea of throwing out a couple hundred perfectly good, albeit incorrect, QSL cards when busily packing for a move.

On the other hand, I do believe that a QSL card should be accurate. Yes, I've used postcards and other substitutes, but I've always been less than pleased with this approach. Besides, being a cheapskate I realize that postcards are one of the more expensive methods of confirming a contact. The fact of the matter is that I eventually had to admit that I need QSL cards on an occasional

**KE8YN/Ø**

Steve Nowak  
16717 Hickory St.  
Omaha, NE 68130-1529 U A  
Douglas County  
(Grid Square EN11VF)  
N 41°14'58" W 96°10'50"

Contact with: \_\_\_\_\_  
Date: \_\_\_\_\_ Time: \_\_\_\_\_ UTC  
Report: R \_\_\_\_\_ S \_\_\_\_\_ T \_\_\_\_\_

   THE NEW! **73 Amateur Radio Today**

**Fig. 1.** My basic QSL card for contacts made from the home QTH as designed on my computer. I like to have all of the information on the front of the card so if the other operator mounts cards on the wall, it doesn't have to be moved to read the contact information. If you enter your information by hand, a "Sharpie" type permanent marker works particularly well.



basis rather than stacks of them on a regular basis. I knew there had to be a better way than to throw away a couple of hundred old cards and order a thousand new cards each time I moved.

I had tried a few methods of generating QSL cards on my computer in the past but was less than thrilled with the results. In some cases I was satisfied with the design but not satisfied with my ability to produce them on anything heavier than typing paper. I tried copying the results onto card stock by use of a photocopier. This seemed fairly economical but I was limited to a single color (black) for the type and any graphics or illustrations I wished to include, although I could use a variety of colored papers to make the cards more interesting.

When I got a color printer I explored the idea of printing cards in color. While this might not be the most advantageous method for people who are big-time contesters, the price of ink is relatively reasonable (especially if you refill your own cartridges) if you only plan on printing small quantities. I had one major problem, though, in that I had a very low success rate in getting the cards cut to the size that I wished. For some reason, my ten matched thumbs ensured that the cards would be cut uneven, misaligned, or in some other manner less than acceptable. My elementary school teachers were never able to adequately correct my deficiencies in penmanship or my ability to cut and paste correctly.

Like many of the great ideas I've had, the one for the computer-generated cards was shelved on several occasions. Instead, periodically I bit the bullet and sent an order off for another stack of cards, many of which found their way into the trash rather than into the mail.

I suspect that many other hams are in a similar situation. We are a particularly mobile society, with many of us enduring moves as a part of our career path. Then there are those who have decided to take advantage of the vanity call system and have changed callsigns. Finally, with the restructuring of the ham radio license system, many of us upgraded in the past year,

including some who elected to change their callsign to reflect their new status.

This year, as the bands opened up I began working more DX stations, particularly from the car. I began to think of how neat it would be to not only replenish the stock of QSL cards but also to have some special QSL cards specifically for mobile operations. Like most hams, practicality is not my defining virtue, but even I had to admit that this presented a few problems. If a minimum order of cards lasts me for quite some time, then a double order would indeed represent overkill. The idea of using the computer to generate the cards once again seemed to be worth entertaining.

While visiting that great American institution (Wal-Mart), I came across a possible approach that might meet my needs. In the stationery aisle was a product labeled "Glossy Photo Quality Postcards for Ink Jet Printers." This product, manufactured by Avery labels (product number 3248) included ten sheets, each of which could be used to print two post cards. The sheets were perforated so that once the printing was completed, the cards could be easily separated. Since the cards included a border that extended beyond the card edge itself, if desired I could print all the way to the edge of the card. The package also included twenty envelopes. I prefer to use envelopes for direct mail in most cases to keep the cards as neat as possible. Since inkjet-printed cards would not be waterproof, this seemed especially important to ensure that the cards arrived in acceptable fashion.

I took the package home and began to play around with various ideas. I mentally sketched an idea as to what I wished to include. Since I tend to write my columns and articles in my mind, this is my preferred approach, but more practical people may want to jot their ideas down on a sheet of paper. I blatantly stole ideas from the QSL cards I've received over the years, picking and choosing the best of other people's ideas. Here are some of the items that I considered:

1. **General layout.** I like to have

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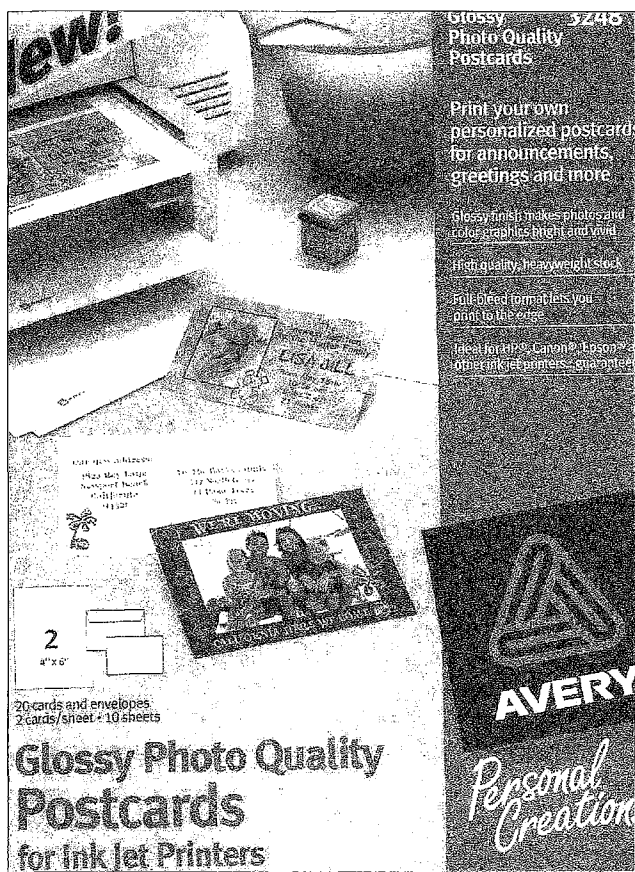


Photo A. Avery's Glossy Photo Quality Postcards for Ink Jet Printers.

everything on the front of the card so that the information can be read if the card is tacked to a wall. This also leaves the back free for comments or a personal note to the other operator.

**2. Callsign.** Although I like graphics, I prefer that the callsign be the most prominent feature of the QSL card. To me the callsign is the key feature, since it defines who I am on the air. Like many hams, people with whom I talk on a regular basis could pass me on the street without knowing who I was. My face and name may not be important, but to other hams my callsign sure is. In my case, since I have chosen to keep the same call I've had for a number of years, I like to indicate the callsign area in which I am currently living, so I want my cards to read KE8YN/4.

**3. Demographic information.** While this may seem obvious, it's a good idea to make a list as to what information you are going to include. Obviously name and address are important, but don't forget to include your country! I

also include the county (or parish or borough) and my grid square since some hams focus on working stations based on these. If you don't know your grid square, you can find it by getting a maidenhead map, or by looking up your own callsign on [<http://www.qrz.com>].

**4. Logos.** Are you active in ARES or RACES? How about MARS or S K Y W A R N? Maybe there's a significant nonham interest you have such as Scouting. If so, you can add the appropriate logos to your card to make it more personal.

to the ARRL. Check the Web pages relating to your favorite activity to see if they have the logo you seek. If you place the cursor on the picture and press the right mouse button, you should see a dialogue box with one choice being "Save Picture As." Scroll down to that choice and click the left mouse button. This will let you save the picture as a file that you can insert into your QSL card later.

**5. Other graphics.** If you or a family member is artistically inclined, you can use a scanner to import a sketch, drawing, photo, or other art form and incorporate it into your design. Digital cameras have become quite reasonable, and for small-size pictures even the basic ones can provide a satisfactory image. While standard photographs can be scanned, the digital photograph can be directly imported into the design. Incidentally, many word processing or other programs have a selection of "clip art" pictures included, and you can purchase CD-ROMs of clip art very reasonably at office supply stores, discount stores, etc. You may find the graphic you seek in these locations.

**6. Contact information.** You'll need to include space for the other station's callsign, their signal report, and of course the date and time of the contact. Some people like this in a table or box format, others as a fill-in-the-blank.

While you may choose to scan these in yourself, a little bit of Web surfing may save you some time. The league's Web page [<http://www.arrl.org>] has a section for logos and pictures relevant

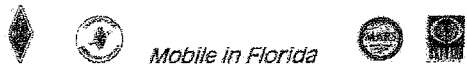

				
 <span style="font-size: 2em; font-weight: bold;">KE8YN/4</span>				
Steve Nowak <span style="float: right;">USA</span>				
1011 Peacock Ave NE Palm Bay, FL 32907-1371			Brevard County Grid Square EL98QA	
Date UTC	Time UTC	Station	Mode	RST
Comments:				

Fig. 2. Since much of the time the only DX time I get is when I'm on the road, it only seemed appropriate to have a separate card for mobile operations. For this card I used a table to format the contact information. The large comments box is to remind me to always add a brief personal note.



**7. Station information.** You may want to include a description of your station equipment. We hams all love to compare our toys, so the type of rig you're using or the specifics of the antenna can be important, or at least interesting. If you're only printing a few cards at a time, it is very easy to change the station description if you change equipment.

**8. Comments.** I often like to write a few words to the other ham, so a space for comments is helpful.

There are many computer programs that can be used to develop your QSL cards, but I decided to use a word processing program since these are so common. Many computers come preloaded with Microsoft Office, so I decided to use Word, Microsoft's word processing program. If you use a different word processor, most of the procedures I describe will be similar. The one advantage of Microsoft Word is that Avery makes a software add-on for Word called Avery Label Wizard that can be downloaded at no charge from their Web site [<http://www.avery.com>]. There are multiple versions available, so make sure that you choose the one appropriate for your version of Microsoft Word.

The downloaded file is self-extracting. Once it is run, the Avery Label Wizard becomes a choice in the Tools menu of Microsoft Word and formats your work to fit the size and shape of the card. In some versions, the #3248 card is not shown on the list of supported formats. Instead, choose product number 8389, which is the exact same product as it is packaged and sold without the envelopes.

If you do not use the Avery Label Wizard, there are several other methods to use to properly format your QSL card. Enclosed in the package with the card stock is a page that has the borders and margins indicated. This can be used to set up your particular program to print properly on the card stock. It may be useful to make a couple of extra copies of this page so that you can test your layout once it is completed. I have found that in some cases the printer may see some things slightly different than the view on the screen, and extra copies will allow you to tweak the layout to make sure that it is just perfect.

The directions that come with the cards recommend that you set the page up as a table. This works out pretty well for many people in most postcard applications. If you want to have a table or box for the station, date, time, and signal report, I recommend that you not choose this option. I have yet to find a way to permit me to put a table inside another table. It probably is possible, but if it takes too many steps, I just tend to look for an easier and more logical approach.

In my case, I decided to set up a page which matched the layout of one of the two cards on the sheet. I figured that I could print one card, reverse the form, and then feed the other end through the printer. In this way, if I wish to customize the card with equipment information or type in the contact information, I can print each card separately. In order to do this, I initially set the left, right, and top margins at 1.25 inches and the bottom margin at 5.75 inches. After printing a test I realized that I would have to modify the margins slightly, which is why the test page can be so useful. In my case all of the margins needed to be readjusted except for the bottom one. The large bottom margin is actually the second card, of course, but that causes the card stock to be ejected by the printer when the top card is done printing.

One of the things I like about this approach is that I can make changes between the two cards, such as one for a mobile card and the other for confirmation with my fixed station. If I save the basic layout of the card as a template, I can type in the actual contact information or specify which equipment was used for that particular contact. On the other hand, if you run more than two cards at a time, particularly if you plan on filling in information with a pen, you may wish to take a slightly different approach and the Label Wizard may be the best bet.

As I mentioned, I do like the fact that the Avery cards come with envelopes, which helps ensure the delivery of a cleaner card to the other station. It would be possible, of course, to design a postal card format for the other side

and mail the card at the lower postal rate. If you are using the card for DX confirmation, though, and send your cards through the ARRL's outgoing QSL bureau, the envelope would not be essential. For same-country use, and if you are really ambitious, you might elect to take the process one step further and use the computer to address and even embellish the envelope. You might choose to add a graphic or a statement about ham radio to the return address. If your handwriting is as notoriously bad as mine is, you may wish to offer the postal service a legible address for a better chance at delivery. I recommend using the bar code printer to add the ZIP code of the recipient, since this will allow the envelope to be routed most quickly. If your software doesn't offer this, the post office system will usually read a typed envelope and add the bar code as it is being sorted, but I figure that every step I can handle myself is usually better.

While using this technique was inspired by the need to make a relatively small number of QSL cards, even active operators may want to design their own cards and then forward them to a printer. I've been told that printing QSL cards is somewhat of a specialty, so you may be advised to pick your printer with care. Many QSL printers are ham radio operators themselves, so they understand what a QSL card is and how we use them. Keep in mind that multicolor QSL cards can be significantly more expensive than single-color cards.

I recently found a printer that will print 200 cards for only \$17. If you do, you may need to modify the margins just a bit, since standard printed QSL cards are three and a half inches by five and a half inches, just slightly smaller than the Avery cards. You might consider designing your own card and having a quantity printed in a single color from your design, but for special contacts printing up a full-color version of the card.

Hopefully these ideas will be helpful to you. If we meet on the air and I talked you into designing your own card, make a note on the card when you send it!



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the May issue, we should receive it by February 28. Provide a clear, concise summary of the essential details about your Calendar Event.*

## FEB 3

**LORAIN, OH** The Northern Ohio ARS will sponsor Winterfest 2002 at Gargus Hall, 1965 N. Ridge Rd., Lorain OH, 8 a.m.-1 p.m. Directions from the East — Take I-90 or the Ohio Turnpike West to the Rt. 57 exit. Go north on Rt. 57 to the first light and turn left. Get in the right lane. The hall is on the right side about a half mile down. It is after the first light and right before Marco's Pizza. Directions from the West — Take I-90 or the Ohio Turnpike East to the Rt. 57 exit. Go north on Rt. 57 to the first light and turn left. Get in the right lane. The hall is on the right hand side about a half mile down. It is after the first light and right before Marco's Pizza. From the South — Many routes cross Rt. 57. Take 57 North through Elyria. Turn right when 57 goes north to Lorain. Pass the turnpike and I-90 to the first light past I-90 and turn left. Get in the right lane. The hall is on the right hand side about a half mile down. It is after the first light and right before Marco's Pizza. Free pancake breakfast. Talk-in on NOARS rpters. 146.700(-) and 444.800(+). Ample all indoor commercial space, reservations required. Tickets \$5 each at the door; includes 1 admission and 1 breakfast. Breakfast will be served from 8 a.m. until 11 a.m. only. 6 ft. tables are \$10 each. All workers require an admission ticket. Set up for vendors begins at 6 a.m., doors open to the general public at 8 a.m. For info contact *John Schaaf K8JWS* at 216-696-5709, or write NOARS via E-mail at [noars@qsl.net], or write to NOARS Winterfest, P.O. Box 432, Elyria OH 44036-0432.

## FEB 4

**SUN CITY, AZ** The West Valley ARC will present an Amateur Radio Equipment Auction at St. Clement of Rome Catholic Church Social Hall, 15800 Del Webb Blvd., Sun City AZ (1/2 mile south of Bell Rd.). Free admission. The Club keeps 10% on equipment sales. Talk-in on 147.30(+). Contact *Jerry W9JIF* at 623-214-8136, or E-mail [w9jif@juno.com].

## FEB 9, 10

**MEMPHIS, TN** "Dixiefest 2002" will be held at the Shelby County Bldg., MidSouth Fairgrounds, Memphis TN, Sat. 9 a.m.-5 p.m., Sun. 9 a.m.-2 p.m. A special forum will be conducted by Riley Hollingsworth, FCC Special Counsel for Amateur Radio

Enforcement. Other forums will also be held. Dealer tables \$40 ea. (up to two weeks before the event), \$45 each the last two weeks. \$50 Feb. 8-10. Flea market tables \$20 ea., power costs extra. Setup Fri. night or Sat. morning. VE exams both days. Food available inside the building. More info at [www.dixiefest.org], or call *Ben KU4AW* at 901-372-8031; or *Melinda KE4DXN*, at 901-744-1737.

## FEB 10

**RICHMOND, VA** The Showplace, 3000 Mechanicsville Tpke., is the location for the Richmond Amateur Radio Telecommunications Society ARRL VA Section Convention/ Hamfest/Electronics show, "Frostfest 2002." National and local vendors. Major manufacturers. Flea market, forums. Handicapped accessible. Parking, refreshments. Talk-in on 146.88. Tickets \$6. Online tickets and general info available at [www.frostfest.com]. Special VIP tickets may be purchased before Jan. 21st for early admission and special entrance. To make reservations call 804-330-3165; or write *Frostfest 2002*, P.O. Box 14828, Richmond VA 23221-0828. For general info call 804-790-0077 opt 4.

## FEB 23

**LaPORTE, IN** The LaPorte ARC Cabin Fever Hamfest will be held at LaPorte Civic Auditorium, 1001 Ridge St., 7 a.m.-1 p.m. Chicago time. Admission \$5, tables \$10. Talk-in on 146.52 and 146.51(-) PL 131.8. Contact *Neil Straub WZ9N*, P.O. Box 30, LaPorte IN 46352, phone 219-324-7525. E-mail [nstraub@worldkey.net]. The club Web site is [www.geocities.com/K9JSI/].

**MILTON, VT** The Northern Vermont Winter Hamfest and ARRL Vermont State Convention will be held at Milton High School, Route 7 in Milton, 5 miles north of I-89 Exit 17. Sponsored by the Radio Amateurs of Northern Vermont, this event will be held 8 a.m.-1 p.m. Features include a flea market, dealers, book sales, forums, demonstrations, and refreshments. VE exams will be given at 9 a.m. and 1 p.m. Commercial exams begin at 1 p.m. Admission is \$3, free for under 18 years. Tables are free while they last. Call for large setups. Check the Web site for the forum schedule and vendor setup info [http://www.ranv.org]. Talk-in on 145.15 rpt. Bulletins on 146.67. Contact *W1SJ* at 802-879-6589, E-mail [w1sj@arrl.net].

## MAR 2

**CAVE CITY, KY** The 26th annual Mammoth Cave ARC Hamfest will be held Sat., March 2nd, 7:30 a.m.-2 p.m. CST, at Cave City Convention Center (I-65, Exit 53). Admission \$6, tables \$7. Tailgating, ARRL forums, Bingo, 3.960 MHz meeting. VE exams at 9 a.m. Contact *Jim Erskine KD4GNN*, [mail@chirotoons.com], or P.O. Box 187, Canmer KY 42722.

## MAR 2, 3

**ANNANDALE, VA** Winterfest<sup>SM</sup>, Metro DC's first and best hamfest, will be held by the Vienna Wireless Society, Sunday, March 3rd, 8 a.m.-2 p.m. at Northern Virginia Community College campus, Annandale VA. VE exams Saturday, March 2nd at 9 a.m. All activities indoors. Directions: In northern Virginia, I-495 (Capital Beltway) to Exit 52A (Rte. 236/Little River Tpk. westbound). NVCC is 1 mile on the left. Admission \$6. Vendor tables \$20. For vendor info, contact *Terry Hines N4ZH*, 703-560-1824. Additional info can be found online at [http://winterfest.home.att.net/]. E-mail [winterfest@att.net].

## MAR 9

**SCOTTSDALE, AZ** The Scottsdale ARC, Inc., will host a hamfest March 9th, starting at 6 a.m., at Scottsdale Community College, 101 North - Exit Chaparral Rd., in Scottsdale. Parking \$2. Tables \$10. RV parking, self contained. VE exams. Refreshments. Talk-in on 147.18. Contact *Ed Nickerson WU7S*, 902 N. 73rd Place, Scottsdale AZ 85257. Phone 480-949-5162, E-mail [Bnickers@qwest.net].

## MAR 9, 16, 23, 28, & SEP 24

**ST. LOUIS COUNTY, MO** Three all-day training Severe Weather Observation seminars are planned at various locations around St. Louis County MO. At most locations SKYWARN Level 1 training will be presented in the morning, and classes resume in the afternoon with the SKYWARN Level 2 Program. Training will be held as follows: Saturday All-Day Classes: March 9th, March 16th and March 23rd. Evening classes (Level 1 only): March 28th and September 24th. For locations call the Severe Weather Information Line, 314-615-7857, for a taped message and additional information. There is no charge for the training.



All are welcome including those from outside the area. Free parking. Certification provided for R.A.C.E.S. and SKYWARN, all at no cost. Attendance by members of the amateur radio community is encouraged, however, one need not be a ham operator to attend and participate in the program. Come and be a part of the largest SKYWARN program in the area, and monitor our SKYWARN nets during severe weather on 146.940 or 147.360 MHz.

#### MAR 16, 17

**MARIETTA, GA** The 49th Annual Kennehooche ARC Hamfest and 1st Emergency Communications Expo will be held at Jim Miller Park (formerly Cobb County Center Park), in Marietta. A map is available on the Club Web site at [<http://qsl.asti.com/hootch/KARC-HamF.html>]. This event is open Saturday 8 a.m.-5 p.m. and Sunday, 8 a.m.-3 p.m. Vendor setup Friday, March 15th, beginning at 1 p.m. Admission (good for both days) \$5 at the gate. Children under 12, supervised by an adult at all times, are admitted free. Along with all the usual hamfest trappings, a one-day (Saturday) Technician Class "Boot Camp" will be held on site. The onsite exam for "boot campers" will be held at 5 p.m. Saturday. All other VE Exams will be at 9 a.m. Saturday only. Bring a copy of your license, there is no copier on the premises. The Emergency Communications Expo will feature exhibits and static displays from local and state emergency teams, vendor booths, and informational seminars. Outside (under cover) bone yard and tailgating spaces are available. Talk-in on 146.880(-) PL 100 (KARC repr.) from Friday, March 15th at 1 p.m., all day Saturday, March 16th; and until 2:30 p.m. on Sunday, March 17th. For more info contact **Mike Fisher KG4DPF**, 770-971-3610; or **Bob Butler W4RBB**, 770-579-9420, before 9 p.m. EST. You can send E-mail to [[w4rbb@arrl.net](mailto:w4rbb@arrl.net)]. Send written inquiries to KARC, P.O. Box 1245, Marietta GA 30060.

**MIDLAND, TX** The Midland ARC will hold their annual St. Patrick's Day Hamfest on Saturday, March 16th, from 8 a.m. to 5 p.m., and on Sunday March 17th from 8 a.m. to 2 p.m., at the Midland County Exhibit Building. Huge inside flea market with many dealers, large tailgate area, T-hunts, and a full service concession stand with hot meals, are some of the features. VE exams will be given at 1 p.m. on Saturday. Pre-registration is \$8, \$9 at the door. Tables for non-dealers are \$12 each for the first four, and \$20 for each additional table over four. For more info, contact the **Midland ARC**, P.O. Box 4401, Midland TX 79704; or contact **Larry Nix N5TQU** by E-mail at [[oilman29@home.com](mailto:oilman29@home.com)]. You can view the hamfest flyer online and download a registration form at [<http://www.w5qgg.org>].

#### MAR 17

**JEFFERSON, WI** The Tri-County ARC will sponsor a Hamfest Sunday, March 17th, 8 a.m.-2 p.m., at the Jefferson County Fairgrounds

Activity Center, Highway 18 West, Jefferson WI. Vendors will be admitted at 7 a.m., all others at 8 a.m. only. Vendors only parking will be provided for unloading. Talk-in on the 145.49 rptr. Admission \$4. Table space for 8 ft. tables @ \$6 each. For further info, contact **TCARC**, 213 Frederick St., Fort Atkinson WI 53538. Evening phone 920-563-6381, Fax 920-563-9551; or send E-mail to [[tricityarc@globaldialog.com](mailto:tricityarc@globaldialog.com)].

**MAUMEE, OH** The Toledo Mobile Radio Assn. (TMRA), will hold its 47th Annual Hamfest/Computer Fair, 8 a.m.-2 p.m., at the Lucas County Rec. Center, 2901 Key St., Maumee OH. For details, send an SASE to **TMRA**, P.O. Box 273, Toledo OH 43697-0273. For voice mail call 419-535-6594. Web [[www.tmrham-radio.org](http://www.tmrham-radio.org)].

#### MAR 23

**BRAMPTON, ONTARIO, CANADA** The Brampton Fall Fairgrounds will be the location for "HAMEX 2002," co-sponsored by the Peel and Mississauga Amateur Radio Clubs. This event will feature amateur radio equipment manufacturers, major commercial vendors, new and used equipment and parts. VE exams, seminars, exhibits and demonstrations. Vendors are admitted at 7 a.m. The general public can enjoy this event from 9 a.m. to 1 p.m. Admission \$6; 6 ft. tables \$25; 8 ft. tables \$30., includes one free admission per table. Talk-in on VE3PRC at 146.880(-), and VE3MIS at 145.430(-). For more info contact **Jason Staines** at 416-878-0576; or **Lorne Jackson**, 905-858-8594. E-mail can be sent to [[va3ngv@rac.ca](mailto:va3ngv@rac.ca)] or [[ve3cxt@rac.ca](mailto:ve3cxt@rac.ca)]. For online info, set your browser to [[www.peelarc.org](http://www.peelarc.org)].

#### MAR 24

**MADISON, OH** The Lake County ARA, of Painesville OH, will hold its 24th annual Hamfest/Computerfest, 8 a.m.-2 p.m., at the Madison High School, 3100 Burns Rd., Madison OH. This event will feature new and used amateur radio, computer, and various other types of electronic equipment. The LCARA Hamfest will also feature craft demonstrations, and VE exams for those interested in earning an amateur radio license. Admission \$5, tickets may be purchased at the door. 6 ft. tables are \$8 each or \$15 for two. 8 ft. tables are \$10 each. For table reservations, call **Roxanne** at 440-209-8953.

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# Ten-Tec's Century 22

*Many of us got our first taste of QRP operation using the Ten-Tec Argonaut 505 or Argonaut 509. However, there's another rig made by Ten-Tec that feels very much at home in the QRP operator's shack. It's the Century 22.*

Ten-Tec told the world that they started with a clean sheet of paper when they set out to design the new rig as a follow-up to the Century 21. What they ended up with was a radical departure from the Century 21, while still holding onto most of its circuits from the Century 21.

## The Century 22

The Century 22 covers the lower CW segments of the 80-, 40-, 30-, 20- and 10-meter bands. It's a CW-only rig, but you can listen in on SSB. The Century 22 operates from an external 12-volt power source and requires about five amps from the supply. You can operate the Century 22 from a 12-volt battery, making the radio ideal for use in the field. (Remember that the Century 21 also operated 12 volts, but the supply was built-in. It was possible to operate the Century 21 from an external power source by back-feeding the power into the AUX jack.)

The Century 22 uses an analog dial with a band segment indicator. The radio also features a built in SWR/power meter. The meter doubles as an "S"-meter on receive. Of course, the Century 22 sports the famous Ten-Tec QSK keying. All of this is wrapped around a solid aluminum chassis with a plastic bezel for the front panel. The Century 22 weighs in at six pounds.

While Ten-Tec did not set out to build another QRP transceiver, the Century 22 can easily operate at the QRP power level. The Century 22 has an input power of about 50 watts. So, figure on about 20 plus watts of RF into a 50-ohm load. For QRP operation, the ALC is simply adjusted to what ever value you want, down to about three watts.

The receiver in the Century 22 is a double direct conversion type. Now, you may be rolling your eyes around, but the receiver in this radio is truly a work of engineering.

It does not suffer from microphonics, drift, or even the howls and whistles one would normally associate with a direct conversion receiver. Instead, you get a radio with plenty of audio, a stable PTO, and an adjustable audio bandpass.

## Inside the Century 22

The top half of the Century 22 case is just about empty. The only "stock" PC board is the final amplifier. There are two spaces reserved for the only two options, the 679 keyer and the 226 calibrator. Either of these options is easy to install. Just screw the board down and plug it in.

The bottom half of the radio holds the majority of PC boards. All the band switching is done with a multiposition wafer switch that passes through the various PC boards. The transmitter output filter board is also located on the bottom half of the radio.

## Operating the Century 22

Unlike a superhet receiver in which you have single signal reception, in a direct conversion receiver, you have a tone on either side of zero beat. To ensure you have the proper sideband, tuning the Century 22 is a bit, well, different.

The best way is to center the RIT control and then tune in a station with the main tuning knob until the station is zero beat. Then move the RIT control until you hear a beat tone. Now you can transmit and the other station will hear you.

One of the nice things about a direct conversion receiver is the ability to tune to the other side of zero beat. If QRM is really heavy on one side, simply move the RIT control to the other side of zero beat.

Once a station is tuned in, you can adjust the audio filter to help reduce QRM. The four-pole audio filter is adjustable down to

200 Hz wide. This audio filter is centered at 750 Hz and provides up to 24 dB per octave. If you like to listen in on your favorite SSB net, opening the audio filter control full clockwise effectively removes the filter from the audio chain.

## Adding some features

Out of the box, the Century 22 has ample space on the inside top half to house the 679 keyer module and the 226 calibrator. Unfortunately, for us, both of these options are no longer being made by Ten-Tec. However there is a work-around available. The guts from the 679 keyer itself will work. So all you need to do is locate a broken K5 keyer from Ten-Tec and strip out the module. It will bolt directly inside the Century 22.

The calibrator is a much harder item to find. If you're lucky, the same calibrator is used in the Ten-Tec Argosy. You might be able to find one inside an Argosy if you find a parts-out Argosy.

There is another option, and that's to build one yourself. I have built two prototypes of the calibrator using surface mount parts. Not an easy project if you have never worked with surface mount IC and transistors. Right now, the stumbling block has been locating a 7490 IC in an SMT package. When I can get all the loose ends together, I'll present the project here.

## Some odd and ends

The other day I was trying to work some DX on ten meters when the radio just up and died. The receiver went dead and the transmit SWR was out of sight. After checking the antennas, I found the problem to be a bad coax jumper cable. The center conductor had broken off inside the connector.

*Continued on page 58*



## Helping Your Community With RDF

*Some years ago, English writer Shirley Conran rewrote Parkinson's Law into her own Law of Housework: "It expands to fill the time available, plus a half hour." Her law could just as easily describe the feelings of most hams, especially those who enjoy radio direction finding (RDF).*

Time really does fly when you're busily finding transmitters. Many a time I have glanced at the clock on a Saturday night hunt for multiple transmitters and have been amazed to see that it had become well past midnight! RDF fun has made the years fly by, too. "Homing In" is now in its 14th year in *73 Amateur Radio Today* magazine.

I'm sure there are still some regular readers who haven't tried RDF contesting yet. Why not? If you're athletic, you could become a champion at on-foot foxhunting, also called radio-orienteeing and ARDF. If you prefer to sit while you enjoy ham radio, try a mobile T-hunt for a new adventure. Who knows where you'll end up and what you'll find!

### Beating the Buzz

As I have pointed out many times over the years, ham radio hidden transmitter hunts, both mobile and on foot, are excellent practice for real-life RDF situations such as tracking aircraft Emergency Locator Transmitters and sources of unintentional interference to both ham and nonham frequencies. If your work involves communications, this knowledge can even help when you're "on the clock."

Paul Shinn KG6AOH of Stockton CA practices his RDF skills on ham transmitter hunts in the San Francisco Bay area, then uses these skills in his work as a broadcast engineer. Besides ham and broadcast radio, Paul is active on the UHF GMRS band. He E-mailed to tell of some of his RDF efforts on those frequencies.

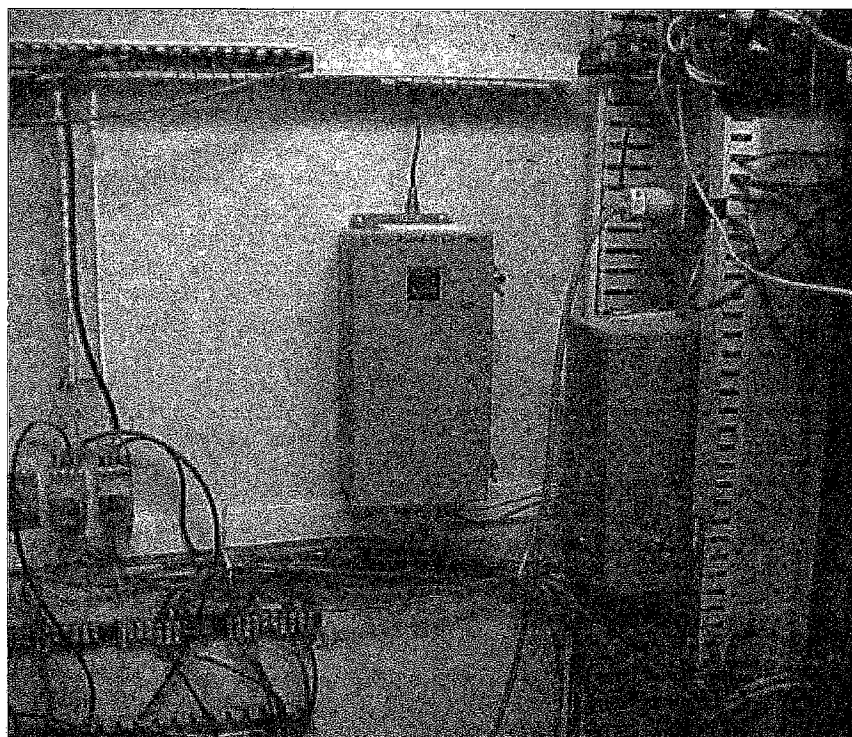
Working with Doug Smith WA6GON, Paul located a data transmitter on 462.7 MHz at a mining company in Lone CA (Photo A). A former owner of the facility had a license for voice operation on that frequency, but digital data on GMRS channels

is not allowed. Later, the two tracked an inventory control system transmitter at a store in nearby Jackson (Photo B). It put out spurious emissions covering almost 300 kHz in the GMRS repeater input band.

Paul prefers doppler RDF methods for this type of hunting because such sets work over wide frequency ranges. His receiver of choice is a Model 1200 Communications Service Monitor by IFR, Incorporated, of Wichita KS [http://www.ifrsys.com]. Covering 100 kHz to 1000 MHz, it has a much "tighter" receiver than a typical hand-held or mobile scanner. It also includes a spectrum

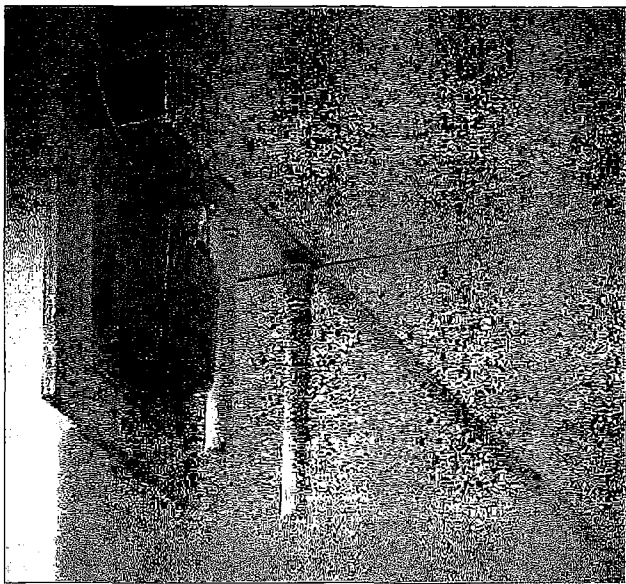
analyzer, deviation meter, and a host of other RF servicing and troubleshooting instruments that he can use to convince owners of interfering equipment that they need to make repairs or adjustments (Photo C).

"I use the IFR 1200 all the time on my bench," Paul wrote. "The receiver is exceptionally selective and also quite sensitive. I can perform RDF in FM narrow, medium, or wide modes, even in really strong signal conditions such as those at high level radio sites. Also, I can demodulate in AM, AM wide, and SSB modes. Of course, while DFing an AM signal, I

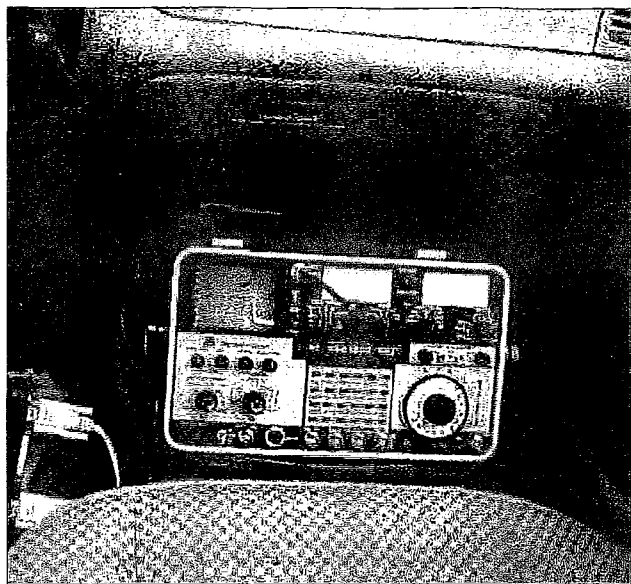


**Photo A.** Owners of a mining company in central California were surprised when two hams tracked down this illegal data transmitter in their facility. (Photo by Paul Shinn)





**Photo B.** This inventory control system in the ceiling of a store in central California caused QRM to GMRS operators. Two volunteer RDF-equipped hams found it. (Photo by Paul Shinn)



**Photo C.** KG6AOH usually does his transmitter hunting alone. His IFR-1200 Service Monitor sits where the passenger's legs would normally be. (Photo by Paul Shinn)

have to use one of the FM modes to get the doppler tone effect."

#### **Delinquents Discovered and Deterred**

Whenever a radio is stolen or lost, there's a good chance that it will show up on the air in the hands of someone using it to cause interference. Hams with RDF equipment and skills can perform a valuable public service by helping to recover the radio and stop the QRM. Such a story came in recently from John Munsey KB3GK of Ormond Beach FL.

"On June 21, I was in Jacksonville when a cell phone call alerted me that there was interference on our school board repeater," John wrote. "Upon returning home, I learned that someone had broken into a Volusia County School Board warehouse and taken at least two hand-held radios, complete with chargers. Now there were voices on the school's communication system, interrupting transportation communications and reporting false emergencies involving school buses. The stolen radios had little value and were headed for recycling, so the major concern was the interference they were causing.

KB3GK continues, "My hunt partner, Bill Thomas KE4HIX, and I went on alert, waiting for the transmissions to resume. I installed my doppler set, packed hunt gear in the trunk of the car, and we were ready. The frequency was 453.425, not in a band normally used for hunting in this area, so new antennas and antenna spacing were required.

"All was quiet for several days, with only an occasional key-up or short comment. The perpetrators appeared smart enough to limit their conversations to quick transmissions so as to not be found. This continued until July 19, when we were alerted that two boys were talking on the frequency. I was about 30 miles away, so I quickly returned and picked Bill up. The hunt was on.

"We decided to hunt only one of the two signals, because that operator was doing 80% of the talking. He also had the strongest signal. Following the doppler headings, we drove almost directly to a location where the signal peaked and the display pointed clearly at one particular house. We circled the block, noting that the doppler heading continued to cross over the same location. To confirm, we drove behind a local business where we were directly in back of the suspect location. Again, the doppler pointed directly at it.

"We drove the street in front of the suspect's house several times in both directions. Each time, the doppler gave a strong lock on the same house. Noting that all windows were covered, we pulled into the driveway to the right of the house. The reading shifted to a solid 270 degrees, pointing solidly at the side of the house. Signal strength peaked and we were satisfied that the target had been found.

"Arrangements had already been made with the Daytona Beach Police for support, so a call was made to Steve Szabo WB4OMM, a supervisor in the Detective Department. In a few minutes, we were

joined by three marked police cars. This area was not in the best part of town, so residents likely suspected a drug bust or other such activities. Several of them were looking out of windows or standing in doorways. A few were brave enough to venture out on their front steps.

"Without a search warrant, the police could not legally enter the suspect house. It was decided that officers would surround the house and then knock on the door to question the occupants. After several minutes, an older lady came to the door and, upon questioning, insisted that there were no children in the house. After some discussion, everyone left. Of course, we suspect that the delay in answering the door was time used to hide the boy and his radio.

"The police officer in charge had little confidence in RDF technology. He described himself as a 'techno-phobic' and was proud that he didn't own a computer. He suggested that we had been misled by an 18-inch satellite TV dish on top of the house and perhaps we had been tracking that. With that attitude, it was not surprising that questioning of the resident was not pressed harder.

"In the boys' conversations, they had made plans to talk again at 2 p.m. the following day, after one got out of school. When that time rolled around, we were in position about two miles away, where we suspected that the other boy lived. Nothing was heard, and at 3:30 we called it a day. We guessed that the previous day's activity had given the boys the scare of their lives.



and that they would either be off the air for a long time or get rid of the equipment. Sure enough, no additional transmissions have been heard.

"We did not recover the radios, but it was a fun hunt and demonstrated to the school board that volunteers doing RDF can be effective in such a situation. If the problem recurs, we will have the cooperation of the board and administration. We will remain on alert."

Nice work, John and Bill! It was wise to make contact with the police ahead of time. When you go after jammers and stolen radios, you're probably not going to be meeting candidates for Citizen of the Year awards. A recent E-mail from Tom Lewis AB5CK of North Richland Hills provided a vivid reminder of that. Tom told of an individual that was tracked down by T-hunters in Lewisville TX after two weeks of malicious interference on a local repeater.

"It was later discovered that this person had 51 legal offenses and 7 convictions against him," AB5CK wrote. Then he went on to point out that this case reinforces the need to use extreme caution on this type of hunt. "Never approach anyone who willingly breaks the law," he concluded. "This guy is bad news! Fortunately, I was not the one who discovered him."

## How to RDF on FRS?

Several "Homing In" readers have E-mailed about the problems of getting RDF bearings on the new Family Radio Service (FRS) frequencies. There are 14 FRS channels, half near 462.6 MHz and the remainder near 467.6 MHz. The letter from Ralph Milnes KC2RLM of Chatham NJ was typical:

"Recently, our RACES group tried to track a signal in the FRS band. Our premise was that we might be asked to find a lost hiker with an FRS radio. We tested in a two-mile square park with lots of trees that hadn't leafed out yet, and surrounding low hills. We weren't very successful using time-difference-of-arrival sets, yagis cut for 462 MHz, and body-shielding techniques. We had trouble attenuating to the right amount and may have been experiencing multipath. I wonder if there are special tips or tricks for RDFing in the UHF range."

Ralph, first it's important to realize that multipath will always be a greater problem on 462 MHz at a given site, compared to 146 MHz. That's because more objects will reflect UHF signals than VHF. If you own a scanner or wide-range handie-talkie that covers the FRS frequencies, you can use it with a built-to-frequency yagi or quad

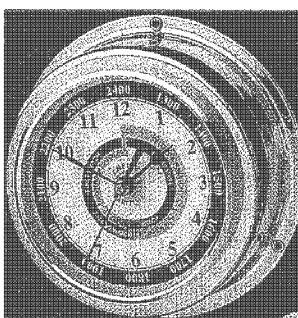
antenna for a very effective on-foot RDF setup (**Photo D**). A lightweight 440 MHz yagi such as the Model 440-3 by Arrow Antenna [<http://members.aol.com/arrow146/>] is a good candidate, if you trim about a quarter inch from each end of each element.

Active attenuators such as the one at my Web site should work just fine with these receivers. For mobile RDF, doppler sets such as the Roanoke Doppler are well suited for use with a scanner or other wide-range receiver on FRS frequencies.

On the other hand, attempting to use those inexpensive "drugstore" FRS radios for RDF in place of a scanner presents two problems. First, FRS radios don't have S-meters. Second, they have permanently mounted antennas with no provisions for attachment of coax.

The waveguide-below-cutoff attenuation technique is a possibility. Using the strap to lower the FRS set into a foil-covered cardboard tube will gradually attenuate the RF going into the case and whip antenna, allowing you to use the classic "body shield" maneuver to get the incoming signal direction. Try it with a tube of about 3-inch diameter and 2-foot length.

Now, here's your homework assignment: Come up with more original, simple, and effective ways of using those "bubble-pack" FRS hand-holds for portable RDF on that



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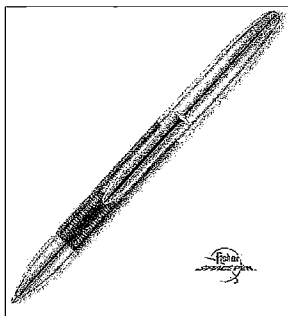
band. The best response, if published here, will earn an autographed copy of my co-authored book *Transmitter Hunting — Radio Direction Finding Simplified* (published by TAB McGraw-Hill, ISBN 0-8306-2701-

*Continued on page 59*



**Photo D.** Dave Reeves AC6PP uses a small yagi and his scanner on the SuperSystem 440 MHz transmitter hunts in Orange County CA. Such a setup is easily adapted to foxhunting on the FRS band.





## New Fisher Space Pens Write for Life, Guaranteed

If you're looking for a great writing instrument that's literally out of this world and guaranteed to last a lifetime, check out Fisher Space Pens' new Mars and Millennium II pens, which combine the performance of pressurized 'space pens' with the guarantee that you'll never run out of ink.

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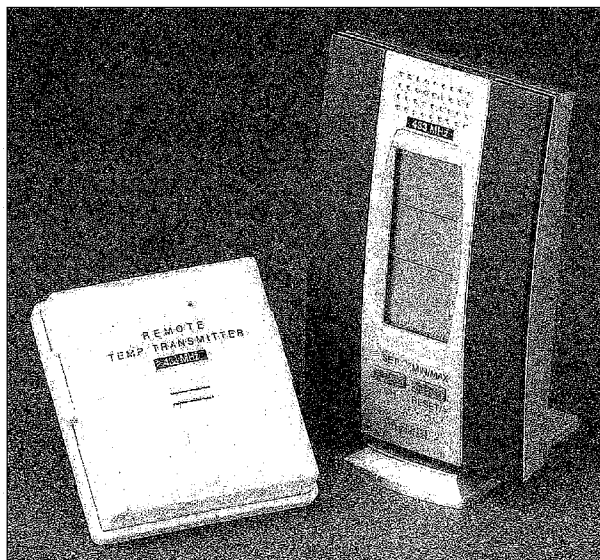
that one pen will last its user a lifetime. With an extra-large-capacity ink chamber and state-of-the-art ink and pressurized ballpoint technology, you should never again run out of ink or worry about buying a refill cartridge. If you happen to outlive the pen, Fisher will replace your pen free of charge.

Unlike ordinary ballpoint pens, which rely on gravity to feed ink, the Mars and Millennium II pens feature pressurized ink cartridges. At nearly 50 pounds per square inch, ink is continuously fed to a tungsten carbide ball, allowing the user to write at elevated angles, including on walls and ceilings, with constant, smooth ink flow.

Both the Mars and Millennium II pens, like other Fisher Space Pens, write in extreme heat and cold (from +300 to -30 degrees F); on wet, moist, or glossy surfaces; and even under water. They possess estimated shelf lives of more than 100 years, with exceptional color strength requiring less ink to write dark readable lines.

Mars and Millennium II Pens are sold primarily through Fisher Space Pens' Web site. Custom engraving is available. For more information, call Fisher Space Pen at 702-293-3011; fax them at 702-293-6616; E-mail [fisher@spacepen.com]; visit [www.spacepen.com] on the Internet; or write to them at 711 Yucca Street, Boulder City, NV 89005.

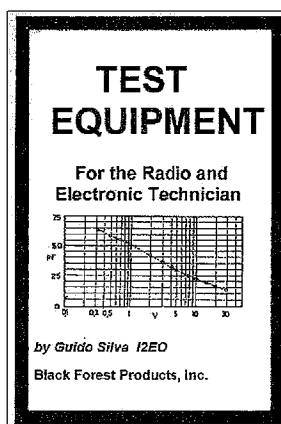
If you're a No-Code Tech, and you're having fun operating, tell us about it! Other No-Code Techs will enjoy reading about your adventures in ham radio—and we'll pay you for your articles. Yes, lots of nice clear photos, please. Call Joyce Sawtelle at 800-274-7373 to get a copy of "How to Write for 73 Magazine."



## Remote Weather Station

This table-standing or wall-mountable Remote Thermo Weather Station, with its impressive design, can be displayed anywhere. Easy to read, its three large LCD displays show time in 12- or 24-hour modes; indoor temperature with a range of 32 to 156.2 degrees F (zero to 69 degrees C); and outdoor temperature from -21.8 to 156.2 degrees F (-29.9 to 69 degrees C). Capable of receiving data from up to three different transmitters. Both the Remote Thermo and the transmitter operate on two AAA batteries (not included). \$34.95.

For further info, contact Scientifics, 60 Pearce Ave., Tonawanda NY 14150-6711; tel. 716-874-9091; fax 1-800-828-3299; E-mail [cons\_order@edsci.com]; Web site [www.scientificsonline.com].



## Test Equipment for the Radio and Electronic Technician

Translated from the Italian, this book by Guido Silva I2EO describes how to build

and use low-cost precision measuring instruments for measuring components and signals to a high degree of accuracy. Every aspect of construction is well described and illustrated by this talented radio school professor, and the 100-page, 6x9 book includes 50 illustrations. \$14.95.

From the Preface: "An affectionate thought goes to those fallen on September 11, 2001 at the World Trade Towers; we suffer and hope with you. God Bless America."

For further information, contact Black Forest Products, 3824 Pembroke Lane, Vestal NY 13850; tel. 607-797-3775. Also available through Barnes & Noble and Amazon.



## To Change and To Serve

*There is no doubt that our perception of the world underwent a significant change on September 11, 2001. Before the terrorist attacks, who would ever have expected that the National Guard would patrol our airports? The concept of Air Force fighters patrolling the skies over New York City and Washington DC was formerly reserved for science fiction.*

Our views as individuals, as citizens, and as a nation have been altered. But as amateur radio operators, how must we change to continue to serve our nation, our communities, and our neighbors?

You can't help but have noticed that amateur radio was there in support of rescue and recovery operations. You may have monitored some of the support efforts or read about it in one of the ham radio publications. In any case, it was obvious that we were represented by hams from all over the country who served as communicators or wherever else they could be useful. But in the same way that after that September morning the words "business as usual" changed their meaning, so we as hams must expect that our role and duties will also change.

I was struck with several things as I read the reports of hams in action and compared them with other news sources. I have long espoused the need to be involved with a public service agency long before the requirement for support exists. This may be the Red Cross or Salvation Army or the county or parish disaster services department. I believe that this is even more critical after 9-11. Showing up with a radio and good intentions will not necessarily get you invited to help out.

Police, fire, and the National Guard must be far more cautious in terms of who is given access to the scene of a disaster. We had the luxury in the past of being able to assume that the damage was due to an accident or a freak of nature. A storm came, caused damage and moved on. The threat was pretty much over. Now we must assume that if the disaster was due to someone's efforts, they may intend to continue to cause harm. The threat may be ongoing during the rescue and

recovery phases. As such, we as hams must expect to be scrutinized with a skeptical eye rather than welcomed with open arms. It needs to be clear why they should allow us access to an area while refusing it to others.

The lesson to be learned here is that it is critical that ham operators and ham radio clubs get to know and to be known by the agencies they expect to serve. They must also be able to be clearly identified by others. If you support a local hospital, you should not expect to be permitted to enter it without having adequate identification. In the past, it was common to report to a central location and then be escorted to one's duty location. This is time-consuming and inefficient, to say the least.

If you are assigned to a particular agency, they may be able to provide the appropriate credentials. This may involve undergoing a background check and then receiving an identification card or badge from the agency you will support. This won't necessarily replace the Amateur Radio Emergency Service (ARES) or Radio Amateur Civil Emergency Service (RACES) card you may carry now, but will be in addition to it. I recommend having your agency identification, ham license, driver's license, and hospitalization card on your person when responding.

Of course, there are also other benefits to being involved in advance with the agency with which you expect to work. It can mean that you will be better prepared to provide assistance because you will have an understanding of what is to be expected. You may even have the opportunity to practice your duties a bit and develop some of the skills before they are actually needed.

September 11th also can be expected to require changes from the way we have traditionally provided support. APRS,

for example, may no longer be the mode of choice for many types of disaster service communications. Although it was beneficial in the past to be able to identify a station's location, in the event of any kind of attack, that information is best kept available only to those who need to know. It may be most unwise to identify where the incident commander is located, much less any key government officials who might be visiting the area. With the advent of so many soundcard-based systems for receiving digital modes, packet, APRS, etc., can be monitored with a scanner, a patch cable, and a computer running shareware. Oddly enough, with the rest of the world abandoning CW as a mode of communication, it may provide one of the most secure methods for handling sensitive traffic. Computer decoding of Morse code is not very effective, so individual skill is needed to provide solid copy.

Another big change appears to be the types of equipment we'll be expected to bring with us. From what I've heard, handheld radios with rubber ducky antennas proved to be virtually worthless. Although they are often of limited utility, this was especially true since several key repeaters were apparently located on or near the World Trade Center. In this type of situation, expect to take along a 25 watt (or higher) dual-band mobile rig with an appropriate antenna and power source. Not only are the additional frequencies useful, but cross-band operation may thwart at least some monitoring.

Finally, don't be surprised if some of the traditional amateur support is moved away from the ham bands. I fully expect to see more emphasis on Military Affiliate Radio

*Continued on page 59*



## More Fun

*The activity in your ham digital modes is increasing exponentially, or at least, that is the way I view it. Just a few years ago, you might find a handful of signals on the waterfall at what could then be considered "prime time." Now, when there is any propagation and there are a few hams awake and at the keyboard, there is worldwide activity. Amazes me — it is the way it should be — just hard to believe we are witnessing such growth in numbers.*

What this means to you is a great opportunity to find enjoyment as never before in ham radio. The playing field is leveling as we find very few hams running any kind of spectrum annihilating power. As a matter of fact, most "big guns" are running less than 50 well adjusted (clean signal) watts to a good antenna. The average successful station is running the same power with a trap vertical or equivalent. And they are not just working stations around the block. Many are working serious DX.

What I am saying is, you can join in the fun with relatively no investment if you already have an HF station on the air.

The reason I started with these thoughts is that I recently received a request from a ham asking for specific items to get started in digital communications. Judging by his message, I decided he was as well experienced as I am with CW and SSB and probably well versed in the vacuum tube era recently gone by. (Recent is a relative statement I will not get into just now <grin>.)

So my answer in a few hundred words explained how he could find directions to make a simple interface such as what I use at a cost of \$20, plus or minus, and just about everything else was free. A new digital ham can bypass the roll-your-own cabling by purchasing one of the several ready-to-plug-in interfaces on the market which range in price from \$40 to \$140.

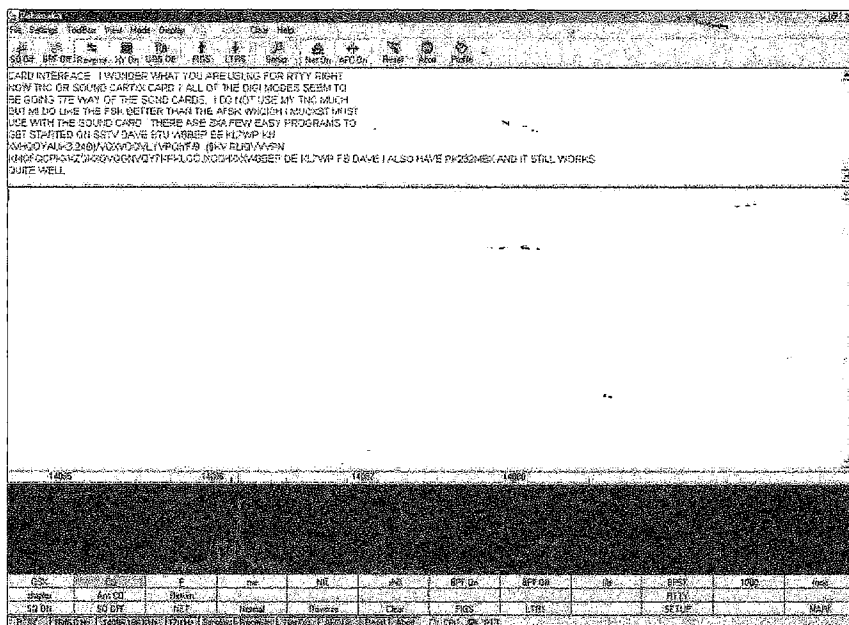
Further, I gave him the URL to find the DigiPan software, which is free, and explained there were links there to find these little black plug-in boxes, all of which seem to work for the hams I run across using them. And, the real biggie is the Help file in the DigiPan software that is so well written

that I direct everyone with a need for plain language explanations accompanied by diagrams to download DigiPan and drink in the information. It has solved more problems remotely for me than any other available method. Quick, but not dirty.

And yes, once we have become hooked on this digital stuff, it becomes ever more easy to justify purchasing all the finery from

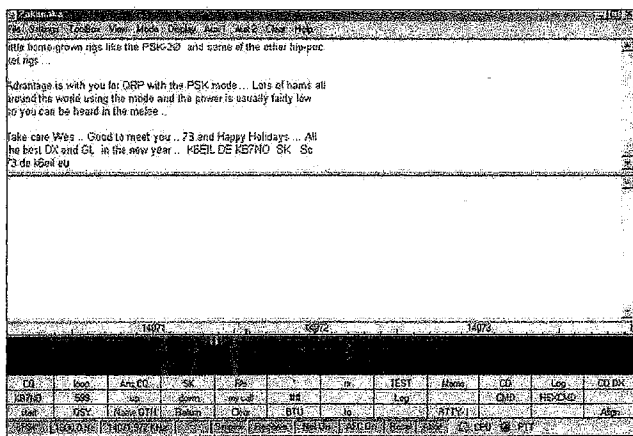
our favorite ham equipment manufacturers. But it is definitely not an expensive portion of the hobby. You can get your feet wet without drowning your bank account.

As you look at all the software with instructions, everything you need is immediately available to get you into this most fascinating aspect of ham radio. There are numerous new modes to choose from, plus a huge



**Fig. 1.** This is a screenshot of Zakanaka in the RTTY mode using the MMTTY engine. I was simply "reading the mail" during this exercise. Note the frequency readout above the spectral display. Logger reads the frequency of the rig and Zakanaka displays it. I have the spectral display on. The contrast in the shot may not make this very plain. The software is set for reverse mode which can be controlled from several menus, the easiest is to click the button at the top of the screen. The 36 macros at the bottom are easily programmed according to the needs of the user (see text). In the middle of the top row of icons is a button for "setup." Click that and the regular MMTTY setup screen appears. Also, the Logger entry screen responds for RTTY logging automatically.





**Fig. 2.** This is Zakanaka in PSK31 mode. This was at the tail end of a real QSO with a QRP PSK station running 750 milliwatts. At first glance this looks about the same as the RTTY mode in Fig. 1. However, you will notice a whole different set of captions on the macro buttons and the toolbar at the top has nothing to do with RTTY. It is like a totally separate program for each mode. In both modes, there are 36 macro buttons which you can control with function keys from the keyboard (see text). I have the waterfall display turned on in this mode. You can use either spectral or waterfall display in either mode. Many other programs have a call box where the other station's callsign is displayed when you double click the call in the receive screen. Here, in either mode, that call box is in the Logger entry screen (see Fig. 3). When you invoke a macro that needs the callsign Zakanaka retrieves it from Logger. The logging system is quite simple to use. If your rig will communicate with Logger, much of the entry is automated.

selection of freeware, so you may get started on this new feast of technology for the low cost of a few hors d'oeuvres. The most expensive piece of equipment you need is your rig, and most rigs manufactured in the last 15 to 20 years can be outfitted for digital performance.

### What price, fun?

Do you need an expensive computer? Simply answered — no. The other day I was working a ham on PSK who had suffered a serious malfunction in his main computer and was operating with a \$10 computer he had rescued from a thrift store. I don't know all the story behind it, but this is a lesson in simplicity. The big-buck machine must not have proved indispensable, especially if it could be replaced with something that sounded pretty obsolete.

As for rigs, in addition to Icom, Kenwood, Yaesu, and Ten-Tec, I work many hams with QRP rigs they have assembled from kits such as Elecraft, and many of the little "pocket-sized" rigs running 1 or 2 watts and powered by dry cells or wall-warts if they are still at home. As an example, today's PSK screenshot (Fig. 2) is the trailing end of a QSO where the other station was running

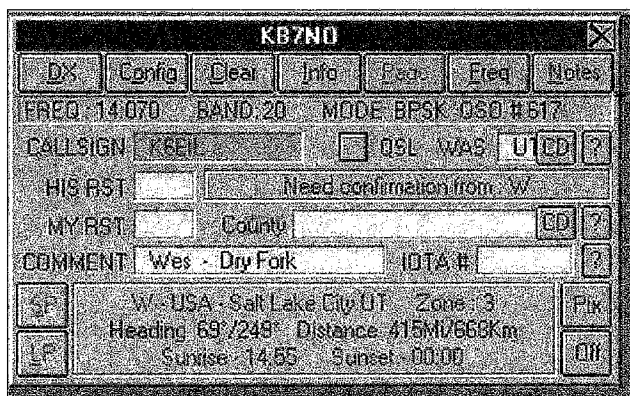
750 milliwatts. And he was truly S-9! A little less than 500 miles away, but still excellent print on the monitor.

So what am I really leading up to this month? I know — you were likely attracted by the pictures. No wonder SSTV is so fascinating. Okay, no airborne pictures, but what we have are best explained by pictures about freeware.

You are going to see some pretty great things you can do with software you can download absolutely free from the Internet. I have done a few articles on the Zakanaka/Logger combo in the past, but the development just keeps on enhancing the product.

You will find the files are relatively large, something around a 45-minute download if you get a good connection. But you probably already know that drill and the consequences when the download slows to a crawl. These particular downloads went like clockwork. No, if you are asking, I do not have cable. Don't see the necessity for a home computer setup.

Several things attracted me to the Zakanaka software this month. This is one of several programs having RTTY capability facilitated by the use of the MMTTY engine from Mako JE3HHT. The



**Fig. 3.** This is the Entry panel for Logger. Logger has many panels to suit its various functions, including a full display of logged contacts you may scroll through or search, as well as a previously worked screen where a familiar callsign pops up on entry. This is the one you deal with the most. After I was finished with the QSO mentioned in Fig. 2 and had logged the contact, I double clicked the callsign again on the receive pane and the above information displayed. By the way, this "6" station was in Utah. You will note the QSO is numbered 617 in the upper corner. I had used the import feature to bring into Logger previous contacts from another file. The 600 contacts took perhaps 2, no more than 3, minutes to import and sort their way into organization. Excellent import feature. If you are searching for nothing more than a full featured logging system and do not wish to pay bucks for it, this is a very useful FREE tool for your hamshack. It will print a hard copy of your log files and also has a label print feature.

full-blown MMTTY program works like a dream as a standalone for RTTY only. Seldom is heard a discouraging word about this soundcard program, even from dyed-in-the-wool green-key aficionados.

At this time, I count three PSK31 programs that are using the MMTTY engine and they all perform well. The others are HamScope and WinWarbler. I have used all three and they are good. I am not going to pass judgment to say which is best, but Zakanaka holds an edge in this computer due to the operating system (ME).

### Why am I down on ME?

I have this new whiz-bang computer that I have mentioned in previous columns and it has this not so whiz-bang operating system referred to familiarly as ME [Millennium Edition (Windows)]. I think I should compile a list of the ham software that will and will not run correctly on the ME system.

And I should do that before I take the next step and install the new XP Windows system which I am led to believe fixes most of these problems. The drawback I see with the XP, though it is another uncharted territory to enter, is that it is reported that if you purchase an over-the-counter piece of new



software you can install that package in exactly one computer equipped with XP.

That doesn't bother me too much, but the principle rubs me the wrong way. I really don't have need to install a single purchase program in bunches of computers but do like to outfit the laptop with the same software as the desktop to facilitate data file transfer.

Anyway, all that aside, I found the software

I wanted to experiment with this month does not work just quite right under ME. It works, but certain necessary aspects cannot be controlled.

By contrast, I am finding that MixW2 runs quite well under ME. And, as I was explaining to the aforementioned ham about DigiPan, it seemed wise to download that program and refresh my memory to be able

to answer questions. DigiPan works like gangbusters, just as if it was running under a "real" operating system like Win95 or 98. Thus far, Windows 98 is the all-time champ in my books for running ham software. Everything works on 98.

So this month I was planning to give a go at the DXLab suite of programs because there has been a lot of progress with these

Source for:	Web address (URL):
Mix W Soundcard program for PSK31, RTTY, new modes, MTTY, FSK31, more	<a href="http://lav.kiev.ua/~nick/mixw2/">http://lav.kiev.ua/~nick/mixw2/</a> <a href="http://www.nvbb.net/~jaffejm/mixwpage.htm">www.nvbb.net/~jaffejm/mixwpage.htm</a>
FREE MMHam site — MMTTY — MMSSTV	<a href="http://www.geocities.com/mmhamsoft/">www.geocities.com/mmhamsoft/</a>
FREE VK7AAB — SSTV-PAL — PSK-PAL	<a href="http://users.origin.net.au/~crac/">http://users.origin.net.au/~crac/</a>
Much ham info w/SSTV downloads	<a href="http://www.conknet.com/~kb1hj/index.htm">www.conknet.com/~kb1hj/index.htm</a>
TrueTTY — Sound card RTTY w/ PSK31	<a href="http://www.dxsoft.com/mtrtty.htm">www.dxsoft.com/mtrtty.htm</a>
Pasokon SSTV programs & hardware	<a href="http://www.ultranet.com/~sstv/ite.html">www.ultranet.com/~sstv/ite.html</a>
PSK31 — Free — and much PSK info	<a href="http://aintel.bi.edu/es/psk31.html">http://aintel.bi.edu/es/psk31.html</a>
Interface for digital rigs to computers	<a href="http://www.westmountainradio.com/RIGblaster.htm">www.westmountainradio.com/RIGblaster.htm</a>
Soundcard interface info — includes AInco	<a href="http://www.packetradio.com/psk31.htm">www.packetradio.com/psk31.htm</a>
Interface info for DIY digital hams	<a href="http://www.qsl.net/wm2u/interface.html">www.qsl.net/wm2u/interface.html</a>
WinWarbler Info and DXLab Suite	<a href="http://www.qsl.net/winwarbler/">www.qsl.net/winwarbler/</a>
MFSK-related tech info — how it works	<a href="http://www.qsl.net/z1bpu/">www.qsl.net/z1bpu/</a>
Throb — New — lots of info	<a href="http://www.lsear.freemove.co.uk/">www.lsear.freemove.co.uk/</a> <a href="http://www.btinternet.com/~g3vfp/">www.btinternet.com/~g3vfp/</a>
Download Logger, also Zakanaka	<a href="http://www.qsl.net/kc4elo/">http://www.qsl.net/kc4elo/</a>
PSKGNR — Front end for PSK31	<a href="http://www.al-williams.com/wd5gnr/pskgnr.htm">www.al-williams.com/wd5gnr/pskgnr.htm</a>
DigiPan — PSK31 — easy to use	<a href="http://members.home.com/hteller/digipan/">http://members.home.com/hteller/digipan/</a>
TAPR — Lots of info	<a href="http://www.tapr.org">www.tapr.org</a>
TNC to radio wiring help	<a href="http://freeweb.pdq.net/medcall/zbx/">http://freeweb.pdq.net/medcall/zbx/</a>
ChromaPIX and ChromaSound DSP software	<a href="http://www.siliconpixels.com">www.siliconpixels.com</a>
Creative Services S/W Multimode w/PSK	<a href="http://www.cssincorp.com/products.htm">http://www.cssincorp.com/products.htm</a>
Timewave DSP & AEA (prev.) products	<a href="http://www.timewave.com">www.timewave.com</a>
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RCKRtty Windows program with free DL	<a href="http://www.rckrtty.de/">http://www.rckrtty.de/</a>
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SV2AGW free Win95 programs	<a href="http://www.raag.org/index1.htm">www.raag.org/index1.htm</a>
Source for BayPac BP-2M & APRS	<a href="http://www.tigertronics.com/">www.tigertronics.com/</a>
Int'l Visual Communications Assn. — nonprofit org. dedicated to SSTV	<a href="http://www.mindspring.com/~sstv/">www.mindspring.com/~sstv/</a>
Hellschreiber & MT63 & MFSK16 (Stream)	<a href="http://tzbbybly.syonline.it">http://tzbbybly.syonline.it</a>
HamScope — multimode w/ MFSK16	<a href="http://users.mesatop.com/~ghansen/">http://users.mesatop.com/~ghansen/</a>
YPLog shareware log — rig control — free demo	<a href="http://www.nucleus.com/~field/">www.nucleus.com/~field/</a>
WinLink 2000 System info	<a href="http://www.winlink.org/k4cjr/">www.winlink.org/k4cjr/</a>
Airmail — free program to use WinLink 2000	<a href="http://www.arimail2000.com/">www.arimail2000.com/</a>
The Chart NOW ON THE WEB	<a href="http://www.geocities.com/normandy214/ham_radio.htm">www.geocities.com/normandy214/ham_radio.htm</a>

Table 1. The infamous chart.

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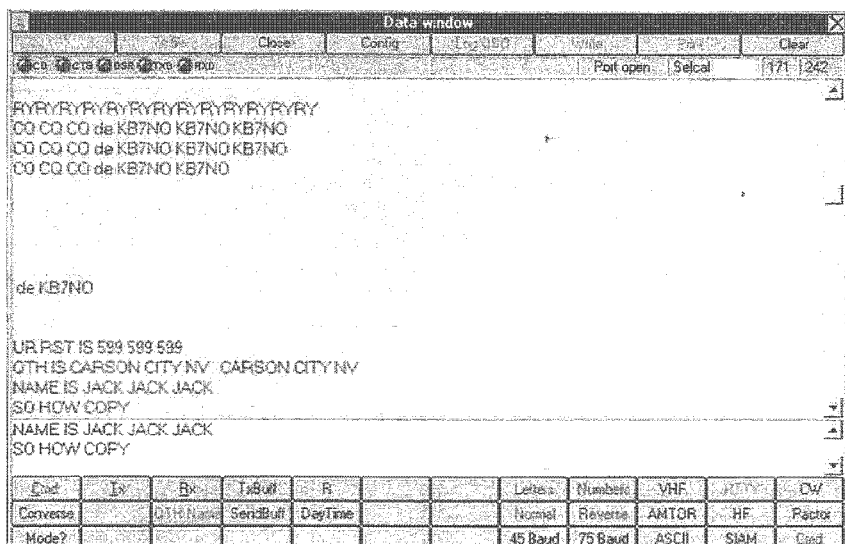
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**Fig. 4.** This is the window to communicate with your TNC. There is a file to download from the same site where you find Logger. It has PK232 in the filename. Open this file and it has a set of instructions along with two files, one of which converts the resident Kantronics controls to PK232 format. Of course, if you want to use your KAM, you won't need this. All is in place for you. Here again is a set of macro buttons to configure and edit (see text). I followed the instructions in the file and it took off and worked just great. Very friendly with the PK232 at this shack. A real winner, and no cost. It also transfers log information to the Logger entry screen. However, in this case, no frequency information to share due to only one serial port available for the exercise. Have to type in the frequency by hand. But the macros will search the Logger information when necessary and pick up the info you have already recorded.

integrated pieces of freeware. A while back I had loaded earlier versions into the Win98 machine and they worked just great. This month I tried the WinWarbler, which now utilizes the MMTTY engine for RTTY and the Commander rig control which has been upgraded to control not only Icom rigs but also Kenwood and Yaesu, and, I think, Ten-Tec.

Well, wouldn't you know? Murphy struck me down. They run sort of all right but have too many bugs when running in the ME environment. I just couldn't give you an honest evaluation. The MMTTY engine seemed to work just fine and I did have a QSO in PSK and it looked as though the logging program was going to perform well — at least at first. Then the situation started downhill. I know for a fact that these programs are running for others, but the requirements say that they can be used on just about every other operating system Microsoft produces except ME.

After puzzling at the dilemma for a bit, I decided that what I was really after was a combination that would do PSK as well as RTTY, using the MMTTY engine and some snazzy logging all intermingled, and possibly a few other goodies. Zakanaka/Logger is the choice of the day.

## Program du jour

You will find a lot of hams using the Zakanaka software combined with Logger, and they are perfectly happy with the setup. Truthfully, I had attempted to install these programs on this computer when I first got it, and the ME system rebelled there as well. But I had mentioned this to a ham on the air not long ago and he was pretty sure these two programs had been modified recently to work with ME.

So, I downloaded fresh copies of the freeware from their Web site as listed in The Chart and they installed perfectly this time. I could not find reference on the Web site concerning ME compatibility, but the rumor was true as best I could tell.

Logger has been a favorite logging program for many hams for a long time. It has easy import and export of files and the program gained a lot of attention a couple of years ago when Bob K4CY added a PSK module to it. This was at a time when most of us were struggling (albeit happily, because PSK31 was new and a resounding success) with the G4PLX original software that had to be tuned oh-so-carefully with the little round tuning indicator. Logger had come on the scene with a spectral display such that you could simply click on the

signal and you were immediately in receive decode mode.

That is an idea of just how innovative some of the K4CY software has been along the way. Then came the development of Zakanaka as a dedicated Windows-based, easy-to-use, PSK31 communications program that works hand-in-hand with Logger to make the beginnings of a total package. Logger will communicate with the popular transceivers of today to monitor frequency and contains band plans you can modify to suit your needs. Makes logging as simple as hitting the Enter key.

Now Zakanaka also supports the MMTTY engine for superb RTTY performance at no additional cost (still freeware). Plus, if your transceiver is conversant with Logger, the recorded frequency readouts are displayed in Zakanaka. This means you can use Zakanaka with Logger running in the background, search for previous contacts and display them, do your automatic logging, and switch back and forth between PSK and RTTY with the click of your mouse.

The downloads and installation were simple enough. I had to do a little thinking and research to get the correct parameters into Logger so it would converse with the Icom rig. Once I got past that hurdle, operation was a breeze. I spent a little time listening to RTTY and found the print was exceptional on some of the weakest signals. When I say weak, I mean the S-meter does not even flicker and the spectral display is just barely alive. MMTTY is a great program, whether you use it as standalone or in one of the shells such as Zakanaka.

After you do digital modes for a while you develop some habits with your macros. I have several absolute must macros I write into every piece of software I use. Both Logger (when you are using the Logger PSK module) and Zakanaka provide simple, straightforward macro "language" that allowed me to get my "crutch" macros organized in just a few minutes.

I needed to make a change in the setup for RTTY and found the button for the MMTTY engine setup (the Setup button) brought up the regular MMTTY setup panel and I was on my way in moments.

Also, while getting into the RTTY mindset, I realized Zakanaka macros that you use for PSK are not carried over when you change to RTTY. There is a whole set of macro buttons at the bottom of each of the screen layouts, 36 for PSK and 36 more for RTTY. You will need to look at each individually and be certain whether you can use them as they "come out of the box."



Editing the macros is a cinch. Place your mouse cursor over the macro button and right-click. In Zakanaka, for either mode, you will get a screen to allow editing to suit your style. In Logger the only difference is a screen pops up asking you if you wish to continue.

I say the macro language used is "plain" language because words such as "transmit" and "receive" are used to cause just those functions. I just realized as I was writing this that you will need to find a list of the commands to put in the macros. Go to the Zakanaka help file and click the Find tab and type in "macro" and you will find several pages of info on customizing your macros including instructions to make "hotkeys" for direct keyboard control of often used functions. I like hotkeys because I don't have to reach for a mouse each time I want to invoke a macro or other control. Lots of options for you to play with.

One other item while I am thinking macros — The 36 macro buttons are related to the function keys in this manner. The top row can be activated simply by striking the function key corresponding to the position of the macro. That is, for "CQ" striking the "F1" key will send that macro and so forth across the board.

The second row of macros requires the Alt key plus the appropriate function key using the same order from left to right. The bottom row uses the Ctrl key plus the function key. This means you will have virtual hotkeys available as soon as you define your personal macros and get used to where they are located. Hint — try to have the same function key send the same macro you are used to from a previous program — saves some embarrassing moments.

There is one other little goodie that will please some of you. Logger will control your KAM or PK232 TNC like a champ. It takes a little patience but all the pieces are in place with instructions to get either one of these TNCs working. I am sure the original need was to communicate with the packet DX cluster. However, if you want to use Pactor or whatever other mode from your TNC you can do it.

I ran into one small trick that had me wondering for a minute during the PK-232MBX setup. The program said it could not open the serial port where the 232 cable was connected. It took a bit to realize that Logger was already using that port to communicate with the Icom rig. Changing that port configuration temporarily solved the problem and wonders could begin.

Although I did not follow through and make the connection to the rig, the impressive part

is how well the program communicates with the TNC. This panel, incidentally is available when you click the "Data" button in the Logger program. See the screenshot.

Here again is another set of macros to define and redefine. The supplied macros are okay but you will need to personalize them to your call and QTH and other data. This group of 36 macros does not lend itself to function key operation but I found a hint in the definition of the "Cmd:" button. If you put an ampersand in when you name the key, you can hit Ctrl + the first letter on the key and then hit the Enter key and it is a kind of two-step hotkey that allows you to keep your fingers where they belong.

As well as this program worked, I still had a few features I could not explore which I blame on this operating system. One of them is the auxiliary screens. There are two of these and they allow you to monitor a second and third PSK signal along with the one you are working with on the main receive screen. Also, I did not find the familiar MMTTY scope.

I keep giving this ME a bad rap, and even though it deserves it, there are some advantages such as stability. Since the time several months back when I disabled the sleep-mode, I would guess there have not been more than five real system lock-ups when it became necessary to shut the power off and reboot.

So, if you are stuck with the ME system and you have software running in it that fits your needs, it will probably just plug along, do the job and you will be a happy camper. Very likely, if I had this in an office/game/entertainment environment for which most home computers are used, I would not have complaints. About the nicest statement I can make, but that is at least one positive vote from your village curmudgeon.

That is about it for this month. There is more happening I am sure. The propagation to the inner recesses of the mind seems to be fading so I will try it again next month. If you would like to ask questions about these subjects, feel free to E-mail me at [KB7NO@worldnet.att.net]. 73 until next time, Jack KB7NO. **73**

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# Your Own Owner's Manual

*Are you recording project accomplishments in a logical fashion for future reference?*

*Your latest project has been completed, and all the planning, painting, and soldering were well worth it. The newest addition to your Homebrew Ham Shack takes its place for all to see. I can see you beaming with pride, even from over here!*

**B**ut, you know what? You aren't finished with the project — not just yet!

When was the last time, when purchasing anything of an equipment nature, you weren't given a pamphlet explaining all about the "widget" just purchased? I'll bet you've gotten an "Owners Manual" with just about everything of value for as long as you can remember. They do come in handy from time to time, like when you need replacement parts and such.

So why not create one for your latest endeavor! No, I don't expect that you would rival Homer's *Iliad*, but a binder containing the important documents, etc., from which the project evolved is a valuable asset.

Let me explain how I preserve the items relating to my endeavors, and what the benefits are from doing this.

When considering a project for construction, I gather the necessary schematics and written articles at my desk. I then photocopy the schematic, ENLARGED, for my use during construction and place the original in a three-ring binder for safekeeping. The written article joins the schematic also at this time. There's a pocket on the

inside cover of the three-ring binder for holding the magazine presently being utilized.

My reasons for doing this are:

1. I am going to "misplace" the schematic and will have to make a second copy to continue building. This is the unwritten #1 law of building at my bench.

2. Drawings of electronic circuits develop a "charge" from the positive and negative circuits on the page, thereby attracting coffee, soda, and other beverages, covering the circuits and rendering the page useless. This is a little known fact of schematicology, but requires yet another copy of the original to be created.

3. The art of using red pencil to identify connections completed and components installed sometimes renders the schematic illegible. Yet another copy would prove to be a bonus.

4. Magazines are shy creatures, evading the sharpest of eyes when being hunted. Better to confine the desired edition before it decides to hide amongst the sofa cushions. This is also a healthy approach to homebrewing, in that it (a) keeps your blood pressure down, inasmuch as you know that the

original is right where you left it and, (b) allows you to refrain from shouting, "Where's my copy of 73?" all the time, thereby avoiding a sore throat, etc.

So now the project has been decided upon and is underway. Parts are either gathered from supplies you already have, or are placed on order.

Place a copy of the order document in the binder also. I have often thought that I ordered a specific part, when in fact I hadn't. Keeping a copy of the "shopping list" enables you to know exactly what you requested, how many, how much, and when it should arrive. Six months from now, I doubt you will remember accurately all of the facts surrounding the purchase.

I sense that you disagree with me, and that your memory is unequalled! OK, to disagree is good — but I can prove my point of view!

Answer the following question, please:

What is the part number and catalog number, cost, and page number from the catalog, of the last electronic part you purchased by mail? From which company? What is their toll-free ordering number?



Can't remember, huh?! Guess a copy of the order would be a good thing to put in the folder should you need parts later on. It saves a lot of time not having to do the research all over again.

As the project progresses, you'll find that changes to the parts are sometimes necessary, either to accommodate a different frequency range, to include another added circuit, etc. Include a page in the binder for "as built" notes. The changes entered, along with any needed formula data, can prove invaluable for future reference. Difficulties encountered and the remedy are useful.

On one page I always describe the finish used on the cabinet and/or chassis. Sounds somewhat trite, but I have found it to be one of the most beneficial items in the folder. The reasons for this are because of the variations between manufacturers and types of primer and paint used, and their names and colors. There can also be a huge difference, depending on which manufacturer you use, between the types of clear spray used to protectively coat the finished panel and its lettering. Not all paints from one manufacturer will accept the clear protective coating of another. The products can interact, making a perfect front panel into a metal plate covered with a soggy, sticky mess. Then you not only get to clean the mess, but you get to repaint and letter the panel again. By logging the primer and color, I can match the color scheme *exactly* when I decide to build the matching power supply and speaker at some later date. Black from the XYZ company isn't exactly like black from the ABC company.

Now your project is complete! You can add any information you desire to Your Own Owner's Manual.

Something nice I've seen are pictures taken during the construction phase. Digital cameras are very useful for this. The pictures can be printed on regular paper and stored in the binder as a "historical document." Visitors to the shack will undoubtedly be impressed by your finished work, and the Owner's Manual allows them to appreciate your efforts during construction.

**WARNING!** This manual does have the capability of becoming reproductive.

One project leads to another, and to another, etc., etc. Plan for future endeavors by leaving enough room in the binder for the next construction item. Dividing the binder into sections, e.g., Receivers, Transceivers, Transmitters, Power Supplies, as your building adventures continue, is a good idea. The binder becomes a history of your building efforts.

Once again, congratulations on your accomplishment! 73

## Weather Sat Tracking is Awesome!

*continued from page 15*

NASA engineers settling some technical point over a cup of coffee.

On the downside however, a number of parents, for some reason, just don't seem to "get it." I believe that perhaps too many of today's activities — such as this project — are just put in a mental overload garbage pile with all the Internet, computer games, and other things of mystery, with no actual effort to try to understand. The concept that there is no "magical" Internet connection and an antenna pointing at the sky seem to be meaningless. A demo was put on at one school open day with only minor interest from the visiting parents, although the roaming kids wouldn't stay away. One parent was even worried that we wouldn't be able to see the satellite through the overcast! There must be a message there somewhere.

All in all, it has been a wonderful experience for me. I started out not knowing what would be possible with the first group of Year 6 students around 11 or 12 years old, but the last group was the youngest yet, a combined class of Year 3/4 at 8 or 9 years old. The photos are of this younger group and are from Glenorie Public School here north of Sydney.

Although this project was not directly linked to amateur radio, there were plenty of opportunities to explain the hobby. I usually have a handheld with me, and after answering the usual question, "What kind of CB is that?", the door is open to talk about why amateur radio is different. I guarantee that any amateur will find volunteer

technical projects such as this a lot more satisfying than any paid job. Primary school students need ham volunteers with their practical, hands-on way of making high-tech things happen. My very first class will be of university age next year. I wonder if our earlier projects will have any impact on their future ... 73

## Direct-Mount "J" Antenna for 440 MHz HTs

*continued from page 23*

rotating collar, and you probably will need to cement the two together. E-6000 clear adhesive works fine. This antenna is not difficult to build, but it does require care and neatness in construction. To duplicate the antenna, just be sure you do in fact do a duplicate and don't deviate. For example, on the coax assembly, don't substitute a different kind or type of coax or alter the specified dimensions.

In doing your final trimming, you will find that the length of the matching section has a greater effect on the resonant frequency of the system than does the length of the radiating element. Plug a small UHF SWR meter (such as Radio Shack #940-0866) directly into the transceiver antenna socket. Plug the antenna PL-259 into the SWR meter without any intervening coax, and use the fewest adapters possible. Obviously, the antenna should be inside the PVC housing while making SWR meter readings.

I have built more than a dozen of these antennas, and an SWR of 1.2:1 or less across the voice-repeater band from 442 to 450 MHz is typical. Outside the band the SWR rises rather rapidly, reaching 1.5:1 at about 439 MHz and 453 MHz. 73

## LOPs to Think About

*continued from page 34*

that provided great satisfaction upon completion. After completing this project I was thinking how it might be of use to the computer hams of today.

*Continued on page 58*



## LOPs to Think About

*continued from page 57*

Currently I have a computer monitor sitting next to the radio with the mouse next to the CW key. With the mill removed the keyboard will fit across the opening and sit on the linoleum desktops. The slide-out shelf below the keyboard makes a good place for the log or note-taking. The naval engineers of 50 years ago didn't know about computers, but it works.

In the July 2001 *QST*, page 119, there is another call for one of these tables, and other USN equipment, by the crew restoring LST-325. I hope they get the overwhelming response that I received. I must say thank-you to all of you for offering great stories, pictures, and especially you two who donated the equipment. You all know who you are.

Does this desk get any use? You bet! Most recently it was used for Straight Key Night 2001. It sees regular service around the HF QRP frequencies, too. 75

## QRP Internet Computing

*continued from page 37*

baud modem can put on the screen. Shell account access with a 33.6kbs modem is awesome.

A LINUX shell account allows you to FTP, Telnet, and — if you wish to learn a few more LINUX commands — get into the hidden byways of the Internet easier than with most popular graphical browsers at national ISPs. You can even teach yourself LINUX from the comfort of your old DOS computer.

E-mail, and reading the Internet's amateur radio USENET newsgroups, is simple because LINUX comes configured with PINE, an easy-to-use program that does both. At the LINUX prompt, type "pine" and you're on your way with the help of a clear menu.

LYNX is the LINUX text browser that provides powerful hypertext linking on the World Wide Web. Typing "lynx" starts the browser with its status bar menu. It just takes a couple of keystrokes and a few seconds to fill

your screen with the Web page you were seeking. LINUX is case-sensitive and most commands use lower case.

The communications program to dial into a shell account must support "VT-100" terminal emulation, and should support Z-Modem, the preferred file transfer protocol. PINE and LYNX need VT-100 to display correctly. Vintage DOS communications programs like Hayes Smartcom, Procomm Plus, COMIT for DOS, and many others offer VT-100 screen emulation and the Z-Modem protocol.

Most Web sites are thoughtfully designed to identify on-line graphic files with the .gif, .jpg, and .bmp extensions. If you want one of them, highlight it with the LYNX cursor and press "d" to start a download to the server. From there, download it to your own computer, where you can open the file with your favorite graphic file viewer.

Once you know how to use a dial-up LINUX shell account, you are virtually independent of computer platforms to access your files, E-mail, and the Internet, whether locally or traveling. You can use any computer with a modem to dial into your ISP.

For unlimited use, the monthly cost of most LINUX shell accounts is about half that of national graphical Internet access charges. ISPs assume: (1) you must be a savvy user to ask for a shell account; (2) therefore they know they won't need to provide you much support; and (3) narrow bandwidth shell accounts demand less resources from their servers compared to a regular account.

There are even "free-nets" still around, that provide dial-in shell accounts as a public service. Colorado has one of the oldest and best, with information about it at [www.nyx.net].

It's time to rethink the notion of computer "obsolescence." It's estimated there are over 250,000,000 pre-Pentium DOS computers in the world, and the ham community surely has its share. None of them needs to be idle or discarded. Their efficient operating systems and programs can easily handle the bulk of the amateur radio community's routine Internet information tasks.

**Bill Boas KCØIZI** is a writer who first went on-line in 1986. 75

## QRP

*continued from page 44*

It turned out that the coax was from Radio Shack and the RG-58 cable has a solid center conductor. Guess it took one too many bends to break the center conductor in half. I would suggest you check your jumpers and replace any of those made up of Radio Shack RG-58 cable.

Radio Shack does sell RG-8U cable and the so-called mini 8 cable. Both of these have a stranded center conductor that won't fail if it is flexed too much.

## The second edition of the *HW-8 Handbook*

Still looking for mods for the HW-7, HW-8, and HW-9 QRP transceivers. They will be in the second edition of the *HW-8 Handbook*. The mods can be as simple as a value change for a part, to a complete reworking of a circuit.

I am hoping for a Dayton 2002 Hamvention release for the book. Inside you will find PC board layouts, assembly diagrams, and, of course, modifications to these radios. This time, too, the book will be full of photographs and drawings. Again, I am hoping for a Dayton 2002 release date.

## QRP AM on the 10-meter band

With the solar flux being somewhat unpredictable, we have had some really strange band openings. One of those has been on the 10-meter band. Now, if you have used this band before, you know it does not take a lot of power to communicate halfway around the planet on just a few watts. This is the case on the AM phone portion of the band as well.

I've been having a ball on 10-meter AM phone using an old Heathkit MT-1 (the Cheyenne) transmitter. The place to be is 29.000 MHz, the AM calling frequency. I use the MR-1 (the Comanche) as the matching receiver. The pair looks good and performs like gangbusters!

When 10 is open, then FM is up the band a bit. My Ten-Tec Argonaut II will transmit on FM. It's really too bad that the Argonaut II won't transmit on AM! I've worked up and down the West Coast from my location in Ohio with nothing more than five watts into a Gap Titan vertical antenna. I've even been able to kerchunk some of the repeaters that populate the 10-meter band.

Ten meters is a strange band. One moment it's open worldwide, and then nothing. The key to working ten meters is to keep checking the band. With today's broadbanded radios, checking the band for activity



is as simple as punching up a memory! Keep an ear open for me. I'll be on 29.000 listening for AM stations.

Next time we meet, I will try to present the Ten-Tec "Power Mite" QRP rigs. These little guys started a company that is still around today. **73**

## HOMING IN

*continued from page 47*

4). I get to choose which submission is best, of course, and if more than one person sends in that idea, the first one received earns the book.

By the way, my book has complete construction plans for the Roanoke Doppler set. An improved antenna switcher for it is fully described at the "Homing In" Web site. This combination is ideal for mobile RDF on FRS frequencies with your scanner.

I'm waiting to hear from you, so send in your suggestions for RDF with FRS radios, along with local hunt reports, RDF-related photos, and news. E-mail is best, but postal mail is fine, too. Addresses are at the beginning of this article. Happy hunting! **73**

## ON THE GO

*continued from page 50*

Service (MARS), Civil Air Patrol (CAP), and such. Since these are directly affiliated with the military, there may be a greater comfort level in turning to known and trained operators rather than well-meaning strangers. If you've considered joining MARS but haven't gotten around to it, now might be a good time.

Over the next few months, I'll be writing about several products that may well lend themselves to situations such as those we may be facing in the future. In the meantime, if you have any lessons learned from the September 11th attack, or other disaster service support, please drop me an E-mail. We need to make sure we're as prepared for the challenges of the 21st century as we were throughout the last one. It's important that we share our experiences. **73**

## NEVER SAY DIE

*continued from page 8*

benefit from the reality of college, maybe you can help steer your children or grandchildren out of a lifetime commuting to a job in business or government.

INC magazine published a survey of the top 100 entrepreneurs. Only a few were college grads. The rest either skipped college (like Steve Jobs) or dropped out — as did Bill Gates. If Bill hadn't dropped out of Harvard when he did, he would have missed the gravy train. Even one year later would have been too late. No hundred billion. And I'll bet his dad was furious with him for doing something so stupid.

A note and clipping from Roy Prince AB6ND about a college education advises that "young people should avoid the ritual grind on university courses which can be irrelevant, badly focused, or simply pointless, being taught by lecturers who have no practical knowledge of the careers for which they are supposed to be preparing their students."

C. Northcote Parkinson had very similar advice in his wonderfully written *Parkinson's Law*. If you haven't read Parkinson, for heaven's sake hie down to a library and rectify this huge gap in your education.

My rule of thumb is simple: If a company is interested in your college credentials when you apply for work, this is not a place you want to waste your time working.

## Super Kids

When I was a kid, my mother read to me while I was eating my lunch, which probably has something to do with thousands of books I've read since then.

WWII broke the barrier. Before that most women had kids and stayed at home to raise them. When all the men

were drafted to go out to kill and be killed, the women moved in to keep the "home front" businesses going. They've never moved out. By 1975, 44% of mothers were working outside the home. That's up to 64% now, with day care centers doing what little child raising that's being done. Now there's a fuss because almost 20% of day care babies have overly aggressive behavior by the time they graduate to kindergarten.

My mother had one room for her studio, where she painted portraits and magazine cover art (this was before color photography had been invented), so she was around the house most of the time. With today's computer and communications systems, more and more women will be able to telecommute, and thus be able to give their babies more attention.

I'd be more in favor of day care centers if more of them would provide the stimuli babies need to help develop their brains — and I don't mean being hypnotized into docility by hundreds of hours of Sesame Street. I review several outstanding books on the subject in my *Secret Guide to Wisdom* — like Joan Beck's *\$7 How to Raise an Outstanding Child*.

One of the big downsides of two-worker families is that the resulting higher family incomes have raised the prices of everything. Prices will always be determined by what people are willing to

*Continued on page 61*

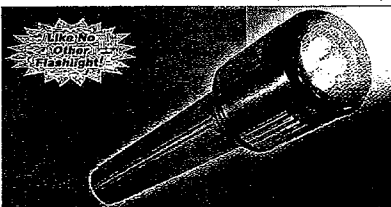
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**73!**



## "Solid"

*This should be a solid month for DXers, with Fair (F) or better conditions prevailing about sixty percent of the time. Although MUFs will often rise above 30 MHz, there will be some great opportunities on all bands, including 80 and 160 meters.*

The best conditions are forecast to occur during the final week of February, but most of the month ought to seem pretty good when compared to the same period last year. Solar flux is again expected to remain very high throughout the month, so look for rapid recovery from ionospheric disturbances when they occur. I've forecast the most intense solar activity for the 4th, 11th, 16th, and 25th, but only moderate geomagnetic effects should result.

To get a short-range idea of what propagation conditions are going to be like, I usually check the Report of Solar & Geophysical Activity found on the Space Environment Center's Radio User's Page [www.sec.noaa.gov/radio]. Their data usually includes the 10.7cm flux and geomagnetic-A values. When the flux index is forecast to be high (above 150) and the geomagnetic index is expected to be low (below 3), good propagation will generally result. Conversely, when the flux value is low (below 90) and the geomagnetic value is high (above 3) then poor conditions will usually prevail.

For lots of other interesting and useful data, visit the IPS Radio and Spaces Services support page for North America at [www.ips.au/asfc/usa\_hf/].

Until next time, 73 and happy DXing!

### Band by Band Summary

#### 10/12 meters

These bands should be pretty active this month. As always, openings start in the east at sunrise and follow the sun westward, closing in Asia by sundown. No openings are expected at night, and daytime performance will begin to deteriorate somewhat toward the end of the month. Short-skip will usually range from 1,000 to 2,500 miles.

February 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
					1 F-G	2 F-G
3 F-P	4 P	5 F-P	6 F-P	7 F-G	8 G	9 G
10 F-G	11 F-P	12 P	13 F-G	14 F-G	15 F-P	16 F-P
17 F	18 F-G	19 F-P	20 F	21 F-G	22 G	23 G
24 F-G	25 P	26 F-P	27 F-G	28 G		

EASTERN UNITED STATES TO:													
GMT	00	02	04	06	08	10	12	14	16	18	20	22	
Central America	15 (40)	20 (40)	20 (40)	(40)	(40)	(20-40)	(15) 20	10-20	10 (20)	10-17	10 (20)	(10) 20	
South America	(15) 20	20 (40)	20 (40)	20 (40)	x	x	(15-20)	x	(10)	10 (15)	10 (20)	(10) 20	
Western Europe	40	40	40	40	(40)	x	(10-20)	10 (20)	(10) 20	(15-20)	(20)	(20-40)	
Southern Africa	(20-40)	(40)	x	x	x	x	x	(10-12)	10 (17)	(12) 17	(15-20)	20	
Eastern Europe	(40)	(40)	x	x	(20)	x	(10-20)	(10) 20	(20)	x	x	x	
Middle East	(40)	(40)	x	x	x	x	(10)	(10-15)	15 (20)	20	(20)	(20)	
India/Pakistan	x	x	x	x	x	x	x	(15-20)	x	x	x	(20)	
Far East/Japan	(15) 20	20	(20)	(20)	x	x	(20)	x	x	x	x	(10-20)	
Southeast Asia	(15-20)	x	x	x	x	x	x	(10-20)	(10-15)	x	x	x	
Australia	(10-17)	(15-20)	x	x	(20)	(30-40)	(20-40)	(10) 20	(10-20)	x	(20)	(10-15)	
Alaska	15-17	20-30	x	x	x	20-30	20-50	15-17	15-17	x	x	15-17	
Hawaii	(10) 15	(20)	20	(20)	20 (40)	40	(20-40)	(20)	(15-20)	x	(10)	(10) 15	
Western USA	(10) 40	(15) 40	(20) 40	(20) 40	40	40	40	(20-40)	(10-20)	10-20	10-20	10-20	
CENTRAL UNITED STATES TO:													
GMT	00	02	04	06	08	10	12	14	16	18	20	22	
Central America	(15) 20	20 (40)	(20) 40	(20) 40	(20) 40	40	(40)	(10) 20	10-20	10-15	10 (20)	15-20	
South America	(15) 20	20	20 (40)	20 (40)	(20)	x	x	x	(10)	10	10 (20)	(10) 20	
Western Europe	(40)	40	40	(40)	x	x	(20)	(15) 20	(10) 15	(15) 20	(20)	x	
Southern Africa	20	(20)	x	x	x	x	x	x	(10-15)	(10) 15	15 (20)	20	
Eastern Europe	x	(40)	x	x	x	x	x	(10) 20	(10-20)	x	x	x	
Middle East	x	(40)	(20)	(20)	x	x	x	(10-15)	(10-15)	(20)	20	(20)	
India/Pakistan	x	(15)	x	x	x	x	(20)	x	(15-17)	x	x	x	
Far East/Japan	x	x	(20)	20	(20-40)	(40)	(20)	20	(15-20)	x	15	(15)	
Southeast Asia	x	x	x	x	(20)	(20)	20	(15-20)	(15)	x	(15)	x	
Australia	(10) 15	15	(15-20)	20	20 (40)	20-40	(40)	(20)	x	x	x	(10-15)	
Alaska	15-17	15-17	x	x	x	40	(40)	20	20	x	x	x	
Hawaii	(10) 15	(15-20)	20	20	(40)	(20-40)	20 (40)	x	(15)	(15)	(15)	(10) 15	
WESTERN UNITED STATES TO:													
GMT	00	02	04	06	08	10	12	14	16	18	20	22	
Central America	(20-40)	40	40	40	(40)	x	(20)	(10) 20	10 (20)	10 (20)	(10) 20	(15) 20	
South America	17 (40)	(20)	x	x	x	x	x	(15)	12 (20)	10-20	10-20	12 (40)	
Western Europe	x	x	(40)	(20)	(20)	x	(20)	(10-20)	(10) 20	(20)	x	x	
Southern Africa	(20)	x	x	x	x	x	x	x	(10)	(15)	15 (20)	(15) 20	
Eastern Europe	x	x	x	x	x	x	x	x	x	x	x	x	
Middle East	(20)	(40)	(20)	20	20	(20)	x	(15)	(10) 15	(10-15)	(20)	(20)	
India/Pakistan	(15-20)	x	x	x	x	x	x	(20)	x	x	x	x	
Far East/Japan	(10) 20	(15-20)	x	x	(40)	40	(40)	x	x	x	(10-20)	10-20	
Southeast Asia	(15)	(20)	x	x	x	x	x	(20)	(15) 20	(20)	(10-15)	10-15	
Australia	(10-15)	(15-20)	x	x	x	(20-40)	(20-40)	20	(15-20)	15	(10-15)	10	
Alaska	10-15	x	x	20-30	20-30	20-30	20-40	x	20	15	x	15-17	
Hawaii	(15) 20	(15) 20	20	(20)	(40)	40	(20-40)	(15) 20	15 (20)	(10-15)	10 (15)	(10) 15	
Western USA	(10) 40	(15) 40	20-40	(20) 40	40	40	(20-40)	(10-20)	10-20	10-20	10-20	10-20	

**Table 1. Band, time, country chart.** Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



## 15/17 meters

You'll find better daytime opportunities here than on 10 and 12 meters, especially into the southern hemisphere. Signals will peak toward the east before noon, to the south around midday, and to the west in the afternoon. Short-skip can be expected to be about 1,000 miles.

## 20 meters

Should continue to improve at night, and is the best overall band for daytime operation. Openings begin at sunrise and last well into the evening hours. Short-skip will average between 500 and 2,500 miles.

## 30/40 meters

Best between sunset and sunrise. Africa, the Middle East, and Asia should provide some good opportunities since atmospheric noise will generally be at very low levels. Short-skip will be under 1,000 miles during the day but beyond 700 miles at night.

## 80/160 meters

I expect these bands to yield some very good opportunities this month, especially when atmospheric static is low. Short-skip on 80 will be 2,000 miles or more, while skip on 160 should average only from 1,000 to 2,000 miles. These numbers, of course, apply only to nighttime operation. 75

## NEVER SAY DIE

*continued from page 59*

pay for things, so this has fed inflation. Penny postcards are now 21¢. First-class mail has gone from 2¢ to 34¢, and nickel ice cream cones are now how much? Two bucks for a cone! That's crazy.

Until I get the time to finish my book on how any parents can raise their baby's IQs by 40 to 50 points, just by knowing what to do when, you'll have to make do with my source material — most of which is reviewed in my wisdom guide.

We are in desperate need of geniuses. Artists, composers, performers, writers, and in business. In politics? It'll never happen.

## What to Write

Henry Hampel KAØTUP asked for someone to write an article about the Fists Club [www.fists.org], which has over 8,000 members. Any volunteers?

I'd like to see a whole lot more on PSK31, the 31-baud phase shift keying

system. Get those word processors into action, please, and get me so excited I can't help but get involved.

## More?

I was putting my editorial essays that couldn't fit into 73 on my Web site for a couple of weeks and then deleting them — until the November 2nd deluge of book orders. That stopped me for almost two months. Now I'm back in gear, so if you want more of my stuff you'll find more of it under "Wayne's Weird World" on [www.waynecgreen.com].

## Schools

In 1983, *A Nation at Risk* was published, warning that our school system was so poor that it was threatening the future of the country. In 1989, an educational summit set the goals to eliminate illiteracy and make American students No. 1 in math and science.

Today, less than half of our 4th-, 8th-, and 12th-graders can read at grade level. For 4th-graders, it's 32%, with black students 12%. By the 12th grade, our kids score well below the teenagers in almost every other developed country in math and science tests.

The remedies suggested by the teacher unions are to pay teachers more and have smaller classes (thus more teachers). These sound good, but there are almost no examples of these moves increasing student test results.

Fortunately, technology will, I believe, come to our rescue.

If you're interested in coming up to speed, I recommend Lieberman's *The Teacher Unions — How They Sabotage Educational Reform and Why*; Encounter Books, ISBN 1-893554-21-X, 321pp., \$17, Laissez Faire Books, 938 Howard Street, SF, CA 94103. Also from Laissez Faire: *The Homeschooling Revolution* by Isabel Lyman, Bench Press International, ISBN 0-9670430-6-9, 142 pp., \$12.

The more you read about our school system, the more you're going to like my solution.

## Distance Learning

For over 2,500 years, teachers and students have met face-to-face for discussion and lectures. Technology has been changing that.

First, it was books. These enable the best brains in the world to reach people anywhere. Technology has been steadily lowering the cost of books, enabling billions of people to share what only dozens could just a few generations ago.

Plus we now have radio, television (with a couple hundred satellite-induced channels), magazines, audio and video

tapes, and (yes) the Internet. Oops, I almost forgot what I consider the current major contender, DVD.

Kids no longer have to walk "three miles through the snow" to get to class. They're either home schooled, or a bus goes by their house and picks them up.

Until the Internet is wirelessly available via satellites (which will be coming soon), I see books and DVDs (digital video disks) as the knowledge delivery systems of choice.

Books and DVDs make it possible for people to learn when it's most convenient for them, not at the convenience of the teacher. For working people, this is usually nights and weekends — unless there's an "important" ball game.

With American colleges and universities already offering over 6,000 accredited courses on the Web, we'll be seeing this movement spreading worldwide as the Internet goes wireless, enabling people anywhere to participate.

Until the Web goes wireless, I see DVD as the media of choice. With professional actors as teachers, aided by state-of-the-art graphics and the ease of using stock film or setting scenes to demonstrate ideas, it's a very flexible and inexpensive media. We'll be seeing interactive lab experiments in every field of science. No more fire in the chemistry lab when you make a mistake — except on your DVD screen.

The inexpensive availability of education on any subject and in any language is a revolution on the order of the printing press. This enables people anywhere to rise from poverty and ignorance. It'll raise hell with the current political and religious systems, which rely on ignorance to control minds and countries.

The one thing that's been lacking so far has been some system of evaluating the worth of distance-learning products. I'm doing my best with my reviews of books I say you are crazy if you don't read. That's my \$5 *Secret Guide to Wisdom*. But that needs to be expanded to embrace all distance-learning media and with input from millions of people, just as I did with my *CD Review* magazine.

I'd love to get such a publication started — first as a magazine — then as both a magazine and a Web resource. Twenty years ago, it cost about \$500,000 to start a nationally distributed magazine. Now it's close to \$1M. If you know anyone with an extra million to invest in changing the whole world, please advise.

Am I being extravagant? It cost me about \$250,000 to start *Byte* in 1975, the first personal computer magazine, and look at the impact it's had!

## Wireless

Nothing yet is what you've seen. Sure, 100 million Americans are slowly frying



what little of their brains they have left after going to public school with cell phones, for which we hams can take full credit. We can proudly brag that we did that. We developed the cellular technology which Motorola and G.E. then built into a new industry — for Nokia.

Today, wireless networks are being built all around the world. Soon we'll have cell phones and Web connections via satellites accessible from anywhere. High speed wireless data connections to businesses and homes will replace fiber, cable, and wire. New cars will call for help when the air bag is deployed or someone tries to steal it. Heck, our Honda van has a global position system which tells us where we are and how to get anywhere we want to go — with a cheery Japanese-accented woman warning us before every route change.

While kids in Pakistan are out tending goats, our kids will be sitting in the back seat of our vans watching any of 200 or so video channels or enjoying their newest DVD-delivered educational programs. Or they may be talking with friends anywhere in the world via their pager-cell phones, complete with a video camera built-in.

### Outing the Ineffable

When I wrote to Jim Lovelock, the author of *Gaia*, suggesting that the Earth itself might have a collective consciousness of all its inhabitants, just as each of us has a consciousness that's the sum of the consciousnesses of our cells, he wrote back that he preferred not to discuss the ineffable.

Ineffable = indescribable, undefinable.

Well, dammit, it's about time to take the wraps off the ineffable and make it effable.

But my big problem is getting across the concepts I have about all this, since we don't have words for them. Yet.

Now, what's ineffable? This is going to take a while, but everything I'm going to discuss is tied together. And all of them are choice targets for skeptics — skeptics who have not bothered to do their homework. Ignorant skeptics.

### Psychic Communications

Can we really communicate with the departed? You bet your bippy we can. Hell's bells, psychics have been doing that for all of recorded history, and a long time before that. And yes, the validity of these communications have been confirmed endlessly.

Rather than me writing a book to prove this, I suggest you find a library with Mae Sewal's *Neither Dead Nor Sleeping*. I've reviewed this 1920 book

in my *Secret Guide to Wisdom* (p. 14). My grandmother, several years after she died, guided my mother to this book when my mother asked one day, "Netta, are you trying to tell me something?"

Mae was a world-known speaker on women's rights, not a tea leaf reader. In her book, she describes how her recently departed husband contacted her and carried on a series of experiments from the other side. Fascinating book.

Konstantine Raudive (*Breakthrough!*) discovered that he could contact the other side using a tape recorder. There are groups in at least a dozen countries doing this. You can read my review of *Voices From The Tapes* on page 25 of my *Wisdom Guide* to find out how you can do this, too. On page 19, I review Dr. Pat Kubris and Mark Macy's *Conversations Beyond the Light*, where their Time-stream Laboratory has made contact with Edison, Einstein, Madam Curie, Werner Von Braun, and even Paracelsus. Heck, they even got a computer-printed photo of Paracelsus.

To learn more about the reality of the so-called spirit works, read books by Moody, Monroe, Montgomery, Brinkley, and others. It's all very well documented.

The spirit world does not experience time as we do, so there's no problem with contacting anyone out of the past.

### Dowsing

Yes, dowsing is real. No, scientists haven't a clue as to why or how. And, yes, I'll tie all this together eventually. Don't be so impatient. It's tough dealing with the ineffable.

The big problem is that you haven't been reading the books I've reviewed in my *Secret Guide to Wisdom*. It's the leading a horse to water, but not getting him to drink syndrome.

Step one is to read Chris Bird's *The Secret Life of Plants*. This will show you that plants are in tune with us on some level. They can in some way sense our thoughts.

The next step is to read *The Secret Life of Your Cells*. This shows that every cell in our body, even if separated by thousands of miles, is still in instant communication with every other cell.

Then you should read J. Allen Boone's *Kinship With All Life*, which explains how you can communicate with any living thing — even a fly.

One more homework book is Rupert Sheldrake's *The Presence of the Past*, his introduction to morphic resonance.

Now you're ready for Dean Radin's *The Conscious Universe*, wherein he shows that precognition, telepathy, and psychokinesis have all been thoroughly proven by scientists to be real phenomena,

no matter how much the pathological skeptics complain.

After this inculcation into the world of the weird, you'll be in a position to grasp the concept of a sum of all consciousnesses. I call this Sigma, just to have a word for it. Sigma can create universes. Scientists have marveled that the physical constants are such that if any of them were different by even the slightest there would be no universe.

Sir Fred Hoyle, the astronomer, in his *Evolution From Space* (p. 11 in my *Wisdom* book), likened the accidental construction of the DNA molecule to the likelihood of a tornado blowing through a junkyard and constructing a 747. It didn't happen by accident.

This is the power that we tap into when we wish or pray for something. Art Bell fans will remember when he had his listeners pray for rain in Texas and Florida, and both states were flooded within hours.

In my *Wisdom Guide* I review the book by Maurey, *The Power of Thought*, and Scott Adams *The Dilbert Future*. Both books explain how you can make things happen by wishing for them.

Since coming to understand how these things work I'm very alert to serendipity. When opportunity knocks I'm right there at the door, Welcome mat out. And it sure pays off.

So, yes, dowsing works. It's been proven endlessly. The best book on the subject is Chris Bird's *The Divining Hand*. Radionics and psychometry also are real. Read William Bennett's *How to Communicate With Plants and Animals*.

How can dowsers find anything and anyone by dowsing a map? Because everything and everybody are all connected on a nonphysical level.

Scientists, instead of shoveling all the psychic data under their enormously bumpy rug, need to take off their blinders and learn more about the metaphysical. I almost said world or universe. The metaphysical isn't physical, so these concepts don't apply. Let's call it Sigma. We honor God with a capital G. Perhaps we should spell it SIGMA, with two capital letters. The Greek letter for it is  $\Sigma$ .

As we know from psychometry, even rocks have ... well, it isn't consciousness ... we don't even have a word for it. But we can contact even the "spirit" of a rock.

If we can break scientists loose from the physical, there's a whole new area for investigation. Quantum physics has lifted the carpet a bit. Or, perhaps, drawn back the curtain just a tad, which is separating the physical from the metaphysical.

*Continued on page 64*



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Bioelectrifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about

the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

**Wayne's Caribbean Adventures:** My super budget travel stories - where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Cold Fusion Journal:** They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

**Julian Schwinger:** A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

**Dowsing.** Yes, dowsing really does work. I explain how and why it works, opening a huge new area for scientific research with profound effects for humanity. \$2 (#84)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. I explain the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts - like Hapgood, Einstein, Snow, Noone, Felix, Strieber. \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with readers who worked for

NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system - the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.  
**1996 Editorials:** 120 pages, 100 choice editorials. \$10 (#72)  
**1997 Editorials:** 148 fun-packed pages. 216 editorials. \$10 (#74)  
**1998 Editorials:** 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)  
**1999 Editorials:** 132 pages of ideas, book reviews, health, education, and

anything else I think you ought to know about. \$10 (#76)

**2000 Editorials:** 76 pages (thinner magazine as a result of our slowly dying hobby) \$5 (#77)

**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Silver Colloid Reprint.** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Kit.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99).

**Wayne's Bell Saver Kit.** The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

**Cold Fusion Six-Pack:** Six Cold Fusion Journal back issues to bring you up to speed. \$20 (#19)

**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs - such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$35 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon you wondered at their weird gait. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of giveaways that the photos and films had to have been faked. \$46 (#93)

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This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

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## NEVER SAY DIE

*continued from page 62*

A hundred years ago Theosophists Bessant and Leadbeater used meditation as a microscope to see the makeup of atoms. They described what we now call quarks and subquarks in their book, *Occult Chemistry*. You can read about their amazing work in Stephen Phillips' *Extra-Sensory Perception of Quarks* (p. 10 in my *Wisdom* guide).

If scientists weren't so blind to these things, they could use this same tool as a telescope which would make the Hubble look like a toy.

Alas, poor old Lovelock is so frightened of what the reaction would be from the scientific world that he is unable to start effablizing the ineffable. But he sure opened the door with his Gaia concept of the world acting as a living thing. Dunno why not, since each of our cells demonstrably has an awareness of what's going on around it. The total of our cells has an awareness. So why shouldn't the total consciousness of everything that makes up the Earth have an awareness? 73



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# 73 Amateur Radio Today

Esoteric

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### REVIEW

- 33 **MFJ's 1899T Portable Antenna — K7UGO**  
*Great for the Yaesu FT-817 or any other QRP rig ...*

## QRX . .

### How Far Down Does This Thing Go? or, Not Really Sure I Wanted to See THAT!

The world of medical communications research has finally caught up with the lights of Hollywood. This, as the government approves a tiny radio camera-in-a-capsule that patients can swallow. It is a camera that

will transmit pictures to give doctors a close-up view of what is inside of you.

The new transmitting video pill is made by Given Imaging Ltd. in Israel. Called the M2A Swallowable Imaging Capsule, it is exceeding tiny. In fact, it is so small that it is easily swallowed by the patient.

Its inventors say that it then painlessly winds its way through the digestive tract and uses wireless

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## Wise Up & Beat the Odds

## NEVER SAY DIE

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### Upsizing America

With Ford laying off 35,000 workers and many other industry giants massively downsizing, as we hear every day on the news, it's time to start upsizing our workforce. In the long run, the shock of being downsized may be the wake-up call that millions of workers need to get them to start thinking in terms of starting their own businesses.

Small business to the rescue. We need to encourage the starting and growth of small businesses. And, by small business, I'm not talking about more mom and pop stores or restaurants, I mean manufacturing or sales companies for niche products.

In my *Improving State Governments* book, I go into detail on how any town can set up a business incubator to help new businesses get started. I recommend that the state establish a fund which these incubators can use, guaranteeing that the state can't lose on the deal.

In my *Secret Guide to Wealth* book, I explain how anyone of any age can learn what they need to know to start and run their own business, with someone else being delighted to pay them to learn.

There are a lot of things you need to know to run your own business, and it can be very expensive to learn the ropes on your own money. This is why 90% of small businesses fail within five years. However, if you know what you're doing, your business isn't likely to fail.

In the book, *Rich Dad,*

*Poor Dad*, the rich dad has his own business and the poor dad is a college professor. The book is reviewed on page 40 of my *Wisdom Guide*.

When I'm driving to the airport to go somewhere, I feel such pity for the long lines of daily commuters. Commuters driving to and from jobs, often for an hour each way. Hey, I did that 50 years ago, driving between my home in Brooklyn and Airborne Instrument Labs in Mineola, Long Island. Or taking the subway to Atlantic Avenue in Brooklyn and then the Long Island Railroad out to Mineola. The subway and train ride at least gave me an opportunity to read. Been there, done commuting. Ugh.

The real strength of our country isn't IBM and U.S. Steel, it's the millions of small businesses. Few people make much money working for our giant industries.

I started publishing 73 in 1960. The magazine has never made a lot of money, but it's allowed me to live comfortably, and to work at something which is so much fun that it should be illegal. It's allowed me to travel the world, and to spin off stuff like *Byte*, a bunch more magazines, newsletters, a ton of books, and several tons of CDs. If you'd been a music lover all your life, how would you like to be the publisher of the country's largest music magazine? Wow! Talk about fun!

So what's stopping you?

### Do They, Still?

When I was in high school

in Brooklyn we boys were lined up in the gym a couple times a year and "inspected." We had to drop our pants and underwear, bend over and part our buttocks for hemorrhoid inspection. I'll bet they aren't still doing that.

In the navy, we had regular short-arm inspection. I wonder if our 21st-century navy is still doing that?

### Reading

The old adage is: "The person who doesn't read is no better off than someone who can't read."

When I read that our schoolteachers read an average of one book a year, and that's a novel, I think of that adage. When I visit people's homes and see no bookshelves, I don't think much of them. My home is so full of books that it's getting difficult to find a place for more six-foot book cases. There are six in my office, ten in my bedroom, 17 in the upstairs hall, 24 in what was a guest room, and 37 in what was a rec room. Oh, there are six more bookcases of books in the barn, plus about 30 cartons of 'em — and I can find any book I want in short order.

I try not to miss any library book sales within easy driving distance (two hardcover books for a buck). I look for interesting books at yard sales (three to five for a dollar), and have found a bunch. The people at the Nashua Barnes and Noble know me well. Then, some wonderful books turn up at the Hancock town dump in the "take it or leave it" shed. Free. I should

be using the Web more to shop for book bargains.

I've read a few novels, but over 99% of my books are nonfiction.

The cream of the crop are reviewed in my *Secret Guide to Wisdom*. I welcome any suggestions from readers on books "I'm crazy if I don't read."

The best brains in the world are available to me through their books. What better teachers could I find in any university?

How do I find time to read so many books? That's easy — I don't have any interest in watching sports. I don't care to watch millionaires playing with balls. I enjoy doing things, not watching others do them. Always have. I also don't watch soap operas, dysfunctional families on the court shows, or the survival shows. And what little TV I do watch is usually while I'm fixing and eating a meal.

### Dammit!

Congress has done it to us again! They recently voted in a \$26.5 billion education bill. No, there was nothing in there about improving the public school system, which has been producing the least-educated kids in the developed world.

But the part that has me in an uproar is their quadrupling of the money devoted to bilingual education.

It's bad enough that the poorest Mexicans are moving up here at the rate of about 500,000 a year, and that the Los Angeles area will soon

*Continued on page 8*



continued from page 1

technology to transmit full color pictures to a belt pack receiver worn by the patient. That unit also decodes the signal and records the information as the patient goes about his or her daily routine.

A U.S. spokesman for Given Imaging says that doctors who wish to use the video imaging pill will have to buy a specialized \$20,000 computer workstation. Each camera capsule costs about \$450.

The entire system is reminiscent of the science fiction movie *Fantastic Voyage*. In that film, a submarine and its crew of medical specialists are miniaturized and injected into the bloodstream of a critically injured man to perform an operation to save his life while receiving instructions by two-way radio.

Or, you could just rent *Osmosis Jones*.

Thanks to Mert Garlick N6AWE and Science Today, via Newsline, Bill Pasternak WA6ITF, editor.

## DX Riddle-o'-the-Month

Name the largest island in the world before the discovery of Australia. (Answer at end.)

## Does Your Bread Land Jelly-Side-Down??

The Basic Rules of Ham Life:

1. Mobile antennas fail in the first 100 miles of a 1,000-mile trip.
2. Manuals mysteriously disappear just before you want to sell a radio.
3. Sellers always have whatever you want back at the shop.
4. Rotors fail on contest day at 2 a.m.
5. As a seller, you never arrive early enough at the hamfest for a cool shady spot.
6. You never have the correct-value replacement fuse.
7. Battery chargers are always left at home.
8. CW is never slow enough to copy at Field Day.
9. No two Atlas 210s work the same.
10. Under "stupidity" in the dictionary is a photo of a ham who just soldered a PL-259 with the fitting nut laying on the table.
11. You always find that other lost gizmo while you're looking for the first lost gizmo.
12. The old accessories for your HT or mobile are never compatible with your new HT or mobile.
13. Elements of antennas that need to be adjusted are always just beyond your reach from the top of the tower.
14. Women and children grasp CW faster than the OM.
15. The polarity of the radio's power cord connector of the unit you want to demo is always wired the opposite of the one you have with you.

Thanks to WCRA's Stray RF, via Mike Herman KC9NF, via Squelch Tale, newsletter of the Chicago FM Club, September 1999.

## Casper SK?

Are cell phones killing ghosts?

No, we are not kidding you. In fact, Tony Cornell, of the Society for Psychical Research, has told the London *Sunday Express* that reports of ghost sightings started to decline when mobile phones were introduced 15 years ago.

According to Cornell, ghost sightings had remained consistent for centuries. In fact, until three years ago, the society had received one or two new ghost sighting reports every week. But with the introduction of mobile phones 15 years ago, ghost sightings began to decline to the point that the society is not receiving any.

And why are there no longer any ghosts being observed? Apparently paranormal events, which many scientists attribute to unusual electrical activity, may be drowned out by the electronic noise produced by cellular telephones and text messaging pager transmitters. And according to the newspaper, the lack of ghost sightings could adversely impact on the nation's economy. It says that haunted tourist attractions in Britain could be under threat if the number of cell phones continues to grow from the present figure of about 39 million now in use in the U.K.

All of this begs that one question be asked: If ghosts are the spirits of the dead, how can anything actually kill them?

Thanks to Don Wilbanks KC5MFA and Science Today, via Newsline, Bill Pasternak WA6ITF, editor.

## Random Access Humor

For sale: parachute, used once, never opened, small stain.

Why did the Howells pack so much for a three-hour tour?

Make headlines! Use a corduroy pillow!

... collect call from Earth, will you accept?

Confusion not only reigns, it pours ...

If at first you don't succeed, redefine success.

Speak the truth, but leave the motor running.

Smith & Wesson: the original "point and click" interface.

I don't cheat, I play by the extended rules.

So easy to use, a child can do it. Child sold separately.

What part of my brilliance don't you understand?

Happiness is a state of mind. Not happy? Change your mind.

Lord, give me patience ... right now!

I am Procrastitron. I will destroy you, eventually.

When you've got no choice, be brave.

A darkroom is not the best place to develop a reputation.

If chocolate is the answer, the question is irrelevant.

Never question authority. It doesn't know either.

You got ta know when to code 'em, know when to modem ...

Smoke may indicate you have passed maximum performance.

Professor: one who talks in someone else's sleep.

Graduate of the Uncle Fester School of Party Etiquette.

Go ahead, make my Danish.

Thanks to Squelch Tale, newsletter of the Chicago FM Club, September 2001.

## 2m Shirt Button?

In another step toward faster computers, Intel Corp. has developed two new technologies that will help the tiny transistors inside microprocessors run cooler, use less power, and operate more efficiently. The new designs complement several recent breakthroughs in building minuscule transistors that form the basis of all modern computing as they switch on and off billions of times a second.

Earlier this year, Intel unveiled transistors just 20 nanometers wide. Today's Pentium 4 has 42 million transistors, each about 180 nanometers.

For reference, a nanometer is about 10,000 times narrower than a human hair.

Is that a shirt button or your 2m rig?

Thanks to Intel via Newsline, Bill Pasternak WA6ITF, editor.

## Plug -'n'-Pay

If you just bought a new computer equipped with the Microsoft XP operating system, or have upgraded your old one, listen up. The Federal Bureau of Investigation says that you should take certain steps to protect yourself against hackers who might try to take advantage of major flaws that have been found in XP.

The bureau's National Infrastructure Protection Center says that in addition to installing a free software fix offered by Microsoft on the company's Web site, consumers and corporations using Windows XP should disable the product's universal plug-and-play features as well. The FBI also warned computer system administrators to actively monitor for specific types of Internet traffic that might indicate an attack was under way.

The FBI did not provide detailed instructions how to disable plug-and-play. Outside experts also caution that disabling the affected Windows XP features threatens to render unusable an entire category of high-tech devices about to go on the market. This includes a new class of computer printers that are easier to set up. But the



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same experts also acknowledge that disabling plug-and-play in XP could afford some protection against similar flaws discovered in the future.

Microsoft considers disabling plug-and-play options as being unnecessary, but the company does acknowledge that Windows XP suffers from serious problems that can let hackers steal or destroy data files across the Internet or implant their own unwanted software. The FBI says that the glitches were unusually serious because they allow hackers to seize control of all Windows XP operating system software without requiring a computer user to do anything except connect to the Internet.

Thanks to Newsline, Bill Pasternak WA6ITF, editor.

## Amazing Discoveries: Circles Within a Circle

One of the most curious pure mathematical discoveries for 2001 was announced in an easy-to-read article at an incredibly long Web site URL. In brief, the article says that research has led to some remarkable geometric findings involving interrelationships between tangent circles and spheres. In other words, mysterious circles within a circle.

As one researcher put it, "Where do these numbers come from? What's going on here?"

It is not true that another responded, "And who cares?"

Find out by going to [[www.sciencenews.org/20010421/bob18.asp](http://www.sciencenews.org/20010421/bob18.asp)].

Thanks to CGC Communicator, via Newsline, Bill Pasternak WA6ITF, editor.

## Riddle Answer

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## NEVER SAY DIE

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be more than 50% Hispanic. Two-thirds of the births there are to Hispanic parents.

I have no objection to people coming to America, but when they do I want them to come here to become Americans, not just displaced Mexicans. I want them to speak American, not Spanish. It's okay for immigrants to be Mexican-Americans, but their kids should be plain Americans. When immigrants come here they are supposed to be assimilated, not be an invasion force.

If immigrants want to continue to speak their native language and maintain their native customs, then why should we let them stay? We have our own language. We have our own customs. When in Rome, etc.

Success in America depends a whole lot on how you look and how you speak. Our schools are doing the kids an enormous disservice by not teaching them how to speak American. American with as little accent as possible. Let's push for assimilation. Let's get our schools to give kids a break in life and not doom them to being second-class citizens because they never learned to talk our language.

The Irish, German, Russian, and many other waves of immigrants in just one generation produced kids who were Americans, so let's not encourage (with billions of our tax dollars) Latinos to doom their children.

Ebonics? Give me a break!

### Mismanagement

Polaroid is in Chapter 11 bankruptcy. The stock is down to 28¢ a share from in the \$60s just four years ago. How come their board of directors and management didn't see digital photography coming? Lordy!

Unfortunately for the thousands of employees of large companies, this blindness is more the rule than the exception. Look at the blindness of all the American car companies. Then, in came the Japanese and ran circles around the hidebound old dinosaurs.

We've watched the same thing happen to GE, RCA, and the other manufacturers of American television and electronics equipment. And cameras. And ham gear.

When the minicomputer giants ruled the computer industry 20 years ago, I sat down with the presidents of Data General, DEC, Wang, and Centronics and tried to convince them that personal computers were the future. They all said they knew the computer industry better than I did and that I was wrong. Ditto the high-ups at Prime Computer.

In 1983, I sold my five computer magazines to International Data Group, the publisher of *Computerworld*. This was ironic, because this was the publication which had for years been ridiculing personal computers at every opportunity as toys and of no interest or consequence to the computer industry. Real computers were kept in air-conditioned rooms, run by men in white coats, and cost a million dollars.

As an IDG director, I met with the other board members in Beijing, where I warned them that *Computerworld* should start admitting that personal computers were real and include the PC industry in their coverage. They didn't want to hear about it and kicked me off the board.

A few months later their major competitor, Ziff-Davis, started *PC Week*, doing exactly what I'd recommended. In a short time it was the equal of *Computerworld* in circulation and revenues. That blindness lost IDG several billion dollars.

The five magazines I sold to IDG, which had been growing in sales at 50% per year for seven years, were soon mismanaged to death by people with no vision of the future.

So I can understand what happened at Polaroid.

Today I need to buy a good digital camera. Am I considering a Kodak? Har-de-har. Should I get the latest Nikon, Olympus, or Canon? Well, my film cameras are Olympus and Nikon — mostly Nikon — so I'll probably settle for a Nikon Coolpix 995 digital camera.

### Cooked Goose

Don't you pity the poor bastards who are addicted to cocaine or heroin? And those kids exhibiting the monumental stupidity of smoking, building one hell of a lifetime (though short) addiction?

Well, step up to a mirror, sucker. You're a drug addict, too, and, like all drug addicts, you won't face the obvious.

No, I'm not talking about drugs like caffeine or alcohol, I'm talking about eating cooked or processed food.

For some reason our schools (including medical schools) don't mention the work of doctors Weston, Price, Pottenger, Comby, Bieler, and Howell. I've written about all of them except Dr. Edward Howell. I even review their books in my *Wisdom Guide*.

Howell's research showed that rats fed cooked and processed food lived about two years. Those eating raw food lived about three years. In people years that's the difference between living 75 years (our current average) and 112.

Rats fed only processed food got fatter and fatter, while their brain weight went down. D'uh?

Howell reported that before Eskimos

were introduced to a cooked diet they mainly lived on raw whale and seal blubber and meat — with no heart disease, cancers, high blood pressure, and so on. They lived long, healthy lives, even without fruit and vegetables.

A study was done with hogs, where one group was fed cooked spuds and the other raw potatoes. Those eating the cooked potatoes gained weight rapidly. Those fed raw potatoes didn't get fat. Howell states, "It is impossible to get people fat on raw foods ... regardless of the caloric intake."

Now, will that be a Big Mac (do you want fries with that?), a Whopper, or another slice of pizza?

Oh, yes: I particularly want to thank the many readers who have written, thanking me for getting them to change their lifestyles to raw food and telling me of their resulting amazing weight losses and their feeling decades younger and healthier.

### Icing Up

Since our media seems totally fixated on global warming, maybe you missed the report that Antarctica picked up another ten inches of snow last year. And that's the hard packed stuff. Zillions of tons of it. Some global meltdown, eh?

In a past essay I included a photo of a hundred-foot derrick in Antarctica which was almost covered in snow after just a few years.

So what? Well, three things — none good. One has to do with Antarctica not being centered over the South Pole. If you'll check the map supplement in the February 2002 *National Geographic*, you'll see that the pole is way over on the eastern part of the continent. So what? The weight of the two-mile high ice has depressed the earth beneath over 3,000 feet from its weight, and that off-center weight is exerting a steady pressure to change the position of the pole — giving some credibility to the predictions of several prophets that a sudden pole change is going to happen.

I've gone into some detail on the predictions by Nostradamus, Edgar Cayce, and other noted prophets on the coming virtual extinction of humanity. Coming soon.

Prophets-shmofets, right? Then you sure haven't been paying attention to my editorial essays where I've reviewed the books showing that precognition has been scientifically proven to be real. Read Dean Radin's *The Conscious Universe*. Read my booklet on *Dowsing*.

Another thing not good? Did you miss the wonderful article in *The New Yorker* (Jan. 7, 2002) on what they've discovered

Continued on page 59



# Switched Mode Power Supplies

*Get out your calculator and have some fun.*

*Switched mode power supplies (SMPS) are relative newcomers to the electronics world. In days gone by, motor-generators, dynamotors, or vibrator supplies were used to convert a battery voltage to some other voltage. Today SMPSEs do that job. They are small, lightweight, and relatively inexpensive, and within the construction capability of the home brewer.*

**T**he power density, watts-per-cubic-inch, of newer commercial SMPSEs is truly amazing. While some newer SMPSEs have densities of 20 watts-per-cubic-inch, most home builders will accept a much lower power density, a larger unit, if they can build it themselves. The home-built supplies may not be the most compact, but they are still a far cry from being boat anchors.

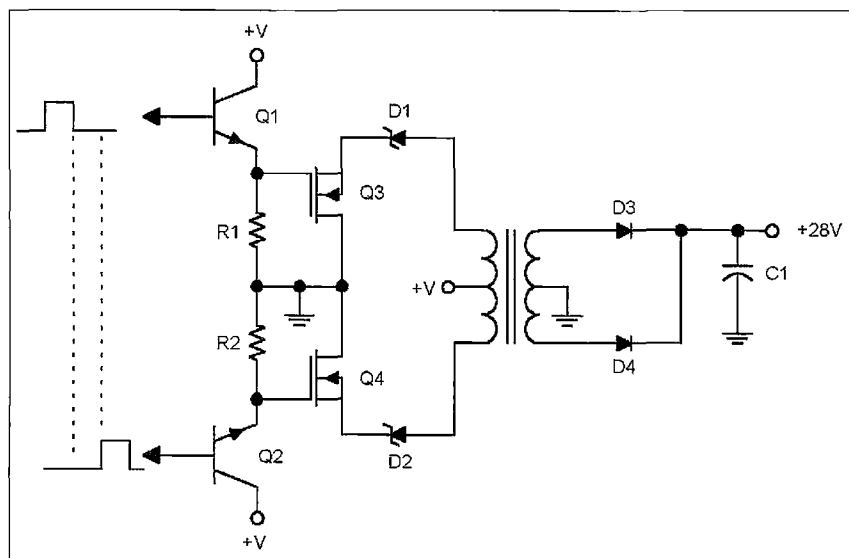
Most conventional power supplies operate from the 60 Hz mains, and have ripple frequencies of 120 Hz. The 60 Hz transformers and chokes are big and heavy, but they are devils we know and have learned to live with. But when we need to operate from a battery, we are pretty much up the creek unless we can work with the battery voltage as it is. Of course, we can still generate 60 Hz with a motor generator

and use the 60 Hz supply, but that is like standing up to paddle a canoe — there are better ways.

Instead of generating 60 Hz, why not 60 kHz or 600 kHz? The transformers and inductors will be much smaller and the filtering much easier. Arguing against a high frequency is component availability. 60 Hz magnetics, transformers, and chokes, are commercially available, but high frequency transformers are not. High frequency transformers are small and easy to wind: A few turns on a ferrite core for an SMPS looks pretty good.

As an example, obtaining 28 volts from a 12 volt source can be achieved with a DC/DC converter: A high frequency oscillator followed by an amplifier. Then rectified and filtered. This solution is certainly simple, but it has no regulation and must be manually adjusted. SMPSEs are regulated and often have a lot of other bells and whistles not essential to generating a stable voltage such as over or under voltage protection, current limiting, or soft start. Once you know what the necessary parts are and what they do you can add these extra functions.

The output of a bare bones unregulated supply changes as the main battery



**Fig.1.** A push-pull amplifier is used to provide the high power output.



voltage changes or as the load changes. An unregulated supply is certainly simple, but adding regulation need not be a deal breaker. It can be as simple as following the unregulated supply with a zenor diode or a three terminal regulator. This is a rather inefficient approach. Another more complex but efficient method is to control the drive to the power oscillator. An even more complex scheme is to sense the DC output and automatically control the drive to the amplifier to maintain the desired DC output voltage. This is an SMPS.

Controlling the output power of an SMPS isn't like controlling the output of a linear amplifier. The output power is controlled by changing the duty cycle of the drive. A push-pull amplifier is shown in Fig. 1. When each transistor is on for full alternate half cycles the output will be maximum, but when each transistor is on for only a part of the half cycle, the output will be less. Changing the duty cycle of the drive is the smart way to change the output voltage.

In Fig. 2, two sections of U1 a CD4001, U1A and U1B, act as a relaxation oscillator. The leading edges of the square wave are differentiated with C2 and R3, and C3 and R4 and logic NOR'd in U1C, then inverted with U1D to produce the trigger for the monostable multivibrator U2A and U2B, another CD4001. The period of U1A and B is approximately  $1/1.39R2C1$ . R1 just stabilizes the frequency with changes in supply voltage. R1 can have any value but something in the range of three to ten times R2 is typical. Large values of R1 can limit the maximum frequency, so at 200 kHz a value of about three times R2 is safe.

The output of the monostable, U2A and U2B, is approximately  $1/0.7C4R5$ . When R5 is made variable the pulse width can be varied. The negative pulse from U2A is logic OR'd in U2C and D to control the duty cycle of the drive to the amplifier. R5 controls the DC output of the converter.

The outputs of U1A and B and the variable pulse from U2A are logic NOR'd in U2C and U2D to produce a variable width positive pulse on alternate half cycles to drive the amplifier.

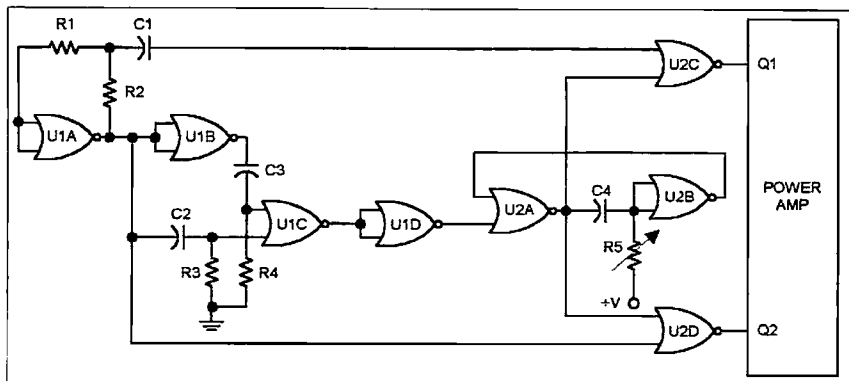


Fig.2. A DC/DC converter can be manually adjusted.

The MOSFETs Q3 and Q4 in Fig. 1 conduct when their gates are positive: Q3 conducts on one half cycle and Q4 conducts on the next half cycle.

Operating with higher frequencies

requires consideration of parasitics that could be ignored at 60 Hz. What were trivial parasitics at 60 Hz become serious problems at 60 kHz and at 600 kHz everything is critical: Leads

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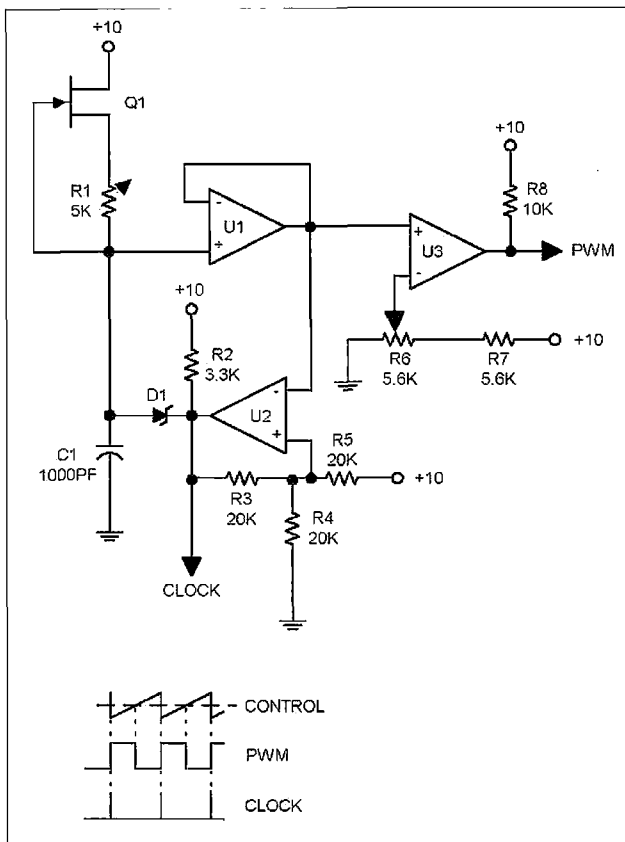
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**Fig. 3. A pulsewidth modulator is an essential part of an SMPS.**

become inductors, capacitors and inductors are resonant circuits, the equivalent series resistance and inductance limit the effectiveness of capacitors. Reverse recovery time of diodes, and storage time of bipolar transistors add to the design problems.

Bipolar transistor problems can be

recovery time can be a significant fraction of the period of the operating frequency. Ignore reverse recovery time at your peril.

Ordinary silicon rectifiers begin to depart from the ideal at a kilohertz or so. For example, the 1N400X series of silicon rectifiers has recovery times of

avoided by using MOSFETs. Since MOSFETs are majority carrier devices, they do not suffer from recovery time, and when driven hard enough can switch in a few nanoseconds. For high frequency supplies MOSFETs are the power devices of choice.

Diode reverse recovery time is a different problem. During the reverse recovery time a diode conducts equally well in the reverse direction, not a good situation.

Reverse recovery times of diodes is short enough to be ignored at 60 Hz, but at higher frequencies reverse

charges through the diode(s) and the source. The diode's dissipation is increased and the load on the source is also much higher than expected. The ripple increases as well. All in all a bad situation.

Schottky diodes and ultra fast diodes have much shorter reverse recovery times and minimize reverse recovery problems. Schottky diodes are an excellent choice in that they have reverse recovery times of a few picoseconds and forward voltage drops of about 0.3 volts. Unfortunately Schottky diodes have a PIV (peak inverse voltage) of only about 30 or 40 volts. Ultra fast diodes have recovery times of 25 nsec or so and PIVs up to 1 kV. Using ultra fast diodes like the Motorola MUR405 or 410 provide a nice safety factor for operating frequencies of several hundred kilohertz.

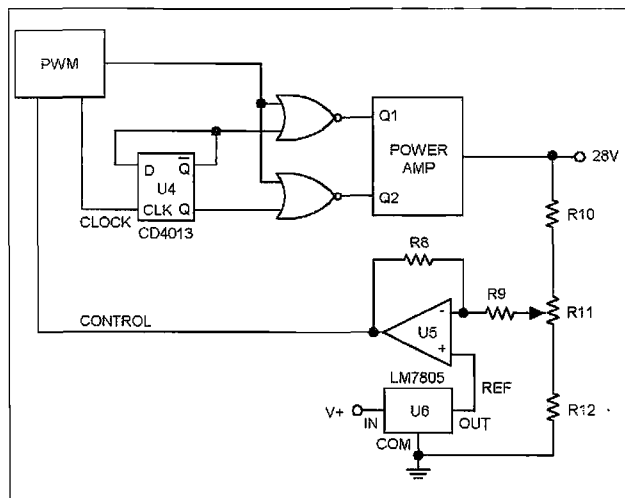
The power amplifier and rectifiers are shown in **Fig. 1**. The Schottky diodes D1 and D2 block the negative swing of voltage at the drains of the MOSFETs. (MOSFETs have a parasitic diode that conducts when the drain is negative.)

While MOSFETs are voltage controlled devices, it takes time to charge their input capacitance and raise the gate voltage. The capacity at the input is not just the gate-source capacity plus the gate to drain capacity; the old bug-a-boo Miller effect gets into the act. The input capacity of an amplifier with a resistive load is:

$$C_{in} = C_{as} + C_{ad} \times (1 + A)$$

$C_{gs}$  is the gate-source capacity,  $C_{gd}$  is the gate-drain capacity, and  $A$  is the voltage gain. To complicate the matter,  $C_{gd}$  is not constant like in a vacuum tube but changes with gate to drain voltage.

MOSFET manufacturers give the input capacity in terms of the total charge needed to be charged to switch the rated drain current when the supply is the rated drain voltage. The total gate capacitance is given as  $Q_T$ . The charge of the input capacitance  $Q_T = i \times t$ , where  $i$  is the charging current and  $t$  is the time the charging current flows. To switch a MOSFET with a  $Q_T$  of 15 nano Coulombs in 150 nsec would require a peak gate current of 100 mA.



**Fig. 4.** A sample of the DC output can be fed back to control the output.



The gate current is a spike of current that decays exponentially to zero as the input capacitance is charged. But the peak current is still 100 mA. The output current of the CMOS gates is only a couple of mils so that more current is required to switch quickly. Emitter followers Q1 and Q2 provide the higher current. Since the emitter followers are not saturated their rise and fall times are fast. Of course, MOSFET driver ICs could be used, but 2N3904s can provide 100 mA and they are cheaper and more readily available.

The transformer is a crucial item in the design of the supply. The turns ratio of the transformer dictates the step-up or down of the main battery supply voltage  $V_+$ . Designing the proper transformer is not a walk in the park, but it's not a deal breaker.

Selection of the wire size depends on the currents involved, and the number of turns depends on the required inductance and the step-up desired. The ampere turns dictate the core size. The turns ratio sets the step up or down of the voltage.

If the main DC source is a 12 V car battery, the voltage can vary from 9 V to 13.8 V; 9 volts is essentially a dead battery and 13.8 volts is a fully charged battery.

If it is desired to build a 28 V 1 A supply powered from a car battery, a 4:1 ratio transformer would step up 9 volts to about 36 volts peak and step up 13.8 volts to about 55 volts peak if the transformer were 100% efficient. With reasonable transformer efficiency and losses in the amplifier and rectifiers, the output should be 30 V minimum and at least 50 V maximum. A toroid will probably be easier to work with than a pot core, but compromises will have to be made. The turns ratios must be whole numbers.

Selecting a core that has the permeability and saturation characteristics is the key consideration. The impedance of the primary with the secondary open should be as large as practical, certainly greater than three times the loaded impedance. The secondary impedance reflected into the primary is the secondary impedance divided by

$N^2$ , the turns ratio squared, 1.75 ohms. The magnetizing impedance should be greater than 5.25 ohms, so that at 100 kHz, a primary inductance of at least 8.4  $\mu$ H is required.

A toroidal transformer wound on a core of Ferronics B material is quite suitable for frequencies up to 500 kHz. As a first cut the 11-282 core is large enough to comfortably accommodate the necessary windings, but as will be shown a single core will saturate. Two cores stacked can increase the effective area and ease that concern.

The magnetic dimensions of two stacked 11-282 cores are:  $A_c = 1.044 \text{ cm}^2$  (each core has an  $A_c = 0.522 \text{ cm}^2$ ,  $l_c = 5.42 \text{ cm}$ .  $L$  computes to be 12  $\mu$ H for one turn. A usable flux density is less than 3,500 Gauss in each core. For two stacked cores the flux density is 7,000 Gauss.

The inductance of a toroid is given as:

$$L = N^2 0.4\pi\mu A_c / l_c \times 10^{-8} \text{ Henries}$$

$L$  also can be given as the inductive index  $A_L$ .

$$\mu = B(\text{Gauss})/H(\text{Oersteds})$$

$$H = 0.4\pi NI / l_c \text{ Oersteds}$$

where:

$A_c$  is effective area in  $\text{cm}^2$ .

$l_c$  is effective length in cm.

$A_L$  is the inductance index, the inductance of one turn.

$$L = A_L N^2.$$

$A_L$  is given as 6,057 nH for the 11-282 core.

The permeability  $\mu$  and maximum flux density  $B$  for B material are given in the data sheets as  $\mu = 5000$  and  $B = 3,500$ . When two cores are stacked,  $A_c$  doubles and doubles the inductive index. Therefore a turn has an inductance  $L = A_L N^2 = 12 \mu\text{H}$  or an impedance of 7.5 ohms at 100 kHz. Remember, each pass of the wire through the hole is one turn.

The transformer has 2 turns centertapped for the primary and 8 turns centertapped for the secondary, or a turns ratio of four to one. The secondary impedance reflected into each half of the primary is  $1/N^2$  or 1.75 ohms. The magnetizing impedance of each half of the primary is  $2\pi f L_p$  or 7.6 ohms. The total current in the primary is the magnetizing current plus the reflected secondary current. The maximum

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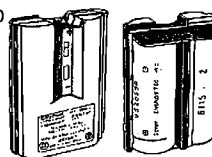
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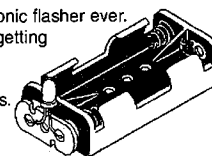
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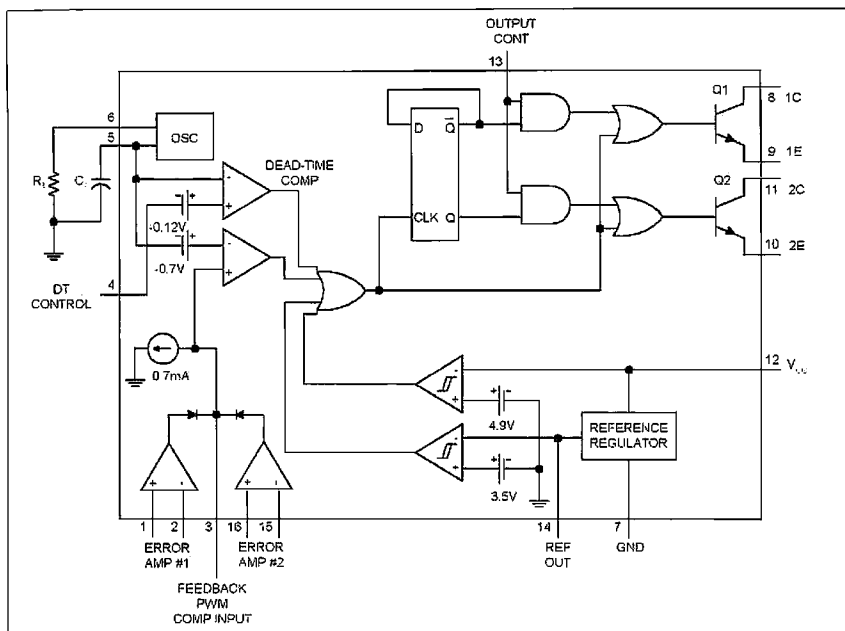
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magnetizing current exists when the main battery voltage is maximum,  $13.8\text{V}/7.6\Omega = 1.8\text{A}$ .

The transformer can be wound on either a ferrite potcore or a toroid core. In most cases a toroid is easier to come by and gaping the core is avoided. In either case, a good rule of thumb is to make the primary's magnetizing current, the current with the secondary open, as low as practical. That is make the inductance as high as practical. A two turn primary would have an inductance of 48 ohms but the field strength would be 2.6, which is too high.

The wire size used depends on the RMS current the wire will be carrying. For a single layer winding the wire size should be greater than 200 circular mils

per amp. In a multi-layer winding transformer the wire size should be greater than 750 circular mils per amp. As an aside, MIL specs limit the wire size in a harness to at least 500 circular mils per amp. Therefore #18 AWG can be used for the primary and #22 AWG for the secondary. The 11-282 core has enough ID to easily allow #18 AWG to be used for both the primary and secondary. The temperature rise of #18 should be well within the temperature limits of any enameled wire, but Formvar® insulation is recommended and is ideal for any homebrewer's applications. Formvar may be a bit difficult to strip, but its toughness makes it a good all-purpose insulation.

The variable pulsewidth in the output of U3 of **Fig. 3** is obtained by comparing a control voltage from R6 to the sawtooth output of op amp U1 in the comparator U3. Decreasing the voltage narrows the output pulse.

the buffer amplifier U1. U2 is a comparator that controls the amplitude of the sawtooth. U3 compares the sawtooth voltage with a pulsewidth control voltage.

The positive going output of U2 also provides the clock for U4 of **Fig. 4**.

The constant current charging C1 is obtained with Q1, a 2N5457 N-channel depletion mode JFET (a MPF102 is a fair substitute for the 2N5457). R1 controls the gate source voltage, and consequently the drain current. For the 2N5457, drain current is independent of drain voltage when drain-source voltage is a couple of volts and drain current is less than 1 mA. The gate source voltage is about 1.4 volts when drain current is 0.88 mA. Under these conditions R1 would be 1.6k.

If you want to do the math, an accurate prediction of the value of  $R1$  can be made when the parameters of the



particular JFET are known. The values given in the data sheets for the 2N5457 are pretty loose:  $I_{DSS}$ , the drain current with gate-source voltage zero, is between 5 mA and 1 mA, and cutoff voltage  $V_{off}$ , the gate-source voltage that reduces the drain current to less than 1  $\mu$ A, is between 0.5 V and 6 V. The MPF102 limits are looser. Not very close, but all is not lost.

The relationship between drain current and gate voltage of a JFET can be expressed as:

$$I_D = I_{DSS}(1 - V_{gs}/V_{off})^2 \quad (\text{Eq 1})$$

where:

$I_D$  = drain current for the particular gate voltage.

$I_{DSS}$  = drain current with the gate-source voltage zero.

$V_{off}$  = gate-source voltage that reduces  $I_D$  to essentially zero (less than 1  $\mu$ A).

$V_{gs}$  = the gate-source voltage that produces  $I_D$ .

Equation 1 can be rewritten to solve for  $V_{gs}/V_{off}$  and  $V_{off}$ :

$$V_{gs}/V_{off} = 1 - \sqrt{I_D/I_{DSS}} \quad (\text{Eq 2})$$

$$V_{off} = V_{gs}/[1 - \sqrt{I_D/I_{DSS}}] \quad (\text{Eq 3})$$

The values of  $I_{DSS}$  and  $V_{off}$  can be determined with a couple of simple tests. A supply of 6 to 20 volts or so, a resistor in the order of 10k and a voltmeter and milliammeter will be needed. Connect the positive voltage to the drain and the negative side to the source. Short the gate to source of the JFET and measure the drain current  $I_{DSS}$ . Connect a 10k or so resistor in the source. Measure the voltage  $V_{gs}$  across the resistor and the resulting drain current  $I_D$ . With  $V_{gs}$  and  $I_D$  known, the value of  $V_{off}$  can be computed with equation 3. With these values of  $I_{DSS}$  and  $V_{off}$  established, the gate-source voltage needed to produce a particular drain current can be calculated with equation 1.

The drain current of a JFET is essentially independent of the drain-source

voltage when the drain-source voltage is above pinch-off. For a typical 2N5457, pinch-off is a couple of volts for drain current of less than 1 mA.

In Fig. 3, PWM is accomplished by comparing the sawtooth voltage to a variable control voltage obtained from potentiometer R6. When the sawtooth voltage on the inverting input of U3 is less positive than the voltage on the noninverting input, the output is high and stays high until the sawtooth exceeds the voltage on the inverting input. Reducing the positive voltage to the inverting input from R6 decreases the width of the positive pulse on the output of U3, and increases the width of the low.

In Fig. 4, U4, a type D flip-flop like the CD4013, is connected to divide the sawtooth period by two. In a D flip-flop, the D input is transferred to the Q output on application of a positive clock pulse. The outputs are 100 kHz square waves (200 kHz divided by 2)

*Continued on page 16*

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## Switched Mode Power Supplies

*continued from page 15*

that control the outputs of the NOR gates that drive the power amplifier.

The rise of the output of U2 of the PWM provides the clock for the CD4013. Therefore, on alternate cycles of the clock (sawtooth) the low output of U4 switches from the Q output to the not-Q output.

The outputs of the NOR gates are high when both inputs are low. That is, when the output of U3 of Fig. 3 is low and one output of U4 of Fig. 4 is low, the outputs of a NOR gate is high and one of the MOSFETs is on.

The DC output can be regulated when a sample of the output is used to control the U3 instead of the voltage from the manually controlled pot R6, as shown in Fig. 4.

Feeding a sample of the output back to control the output is simple in concept, but the devil is in the details. The feedback considerations are exactly the same as those for any feedback amplifier: the feedback must be 180° out of phase with the input until the gain of the amplifier has fallen to less than one. When the voltage feedback is in phase with the input, or nearly so, the system will oscillate. Therefore care must be taken to insure that the phase of the feedback signal is always at least 150° out of phase with the input.

The operational amplifier, U5 in

Fig. 4, compares a sample of the output DC with a fixed reference DC voltage to provide the control voltage for the PWM. An increase in the output of the DC voltage causes the output of the error amplifier U5 to be less positive and narrows the PWM's positive pulse.

The feedback to the PWM forces the inverting input of U5 to be 5 volts. Therefore, adjusting R11 in Fig. 4 changes the voltage division and varies the DC output voltage. R9 minimizes the change in input resistance of U5 and consequently the gain of the amplifier as R11 is changed.

The stability of the output voltage is essentially the stability of the reference voltage and the closed loop gain of the amplifier. The gain of the error amplifier U5 is the chief determinant of regulation with changes in load. A small change in the output voltage produces a significant change in the control voltage fed back to the PWM.

In the example given, 9 to 13 volts was assumed across each half of the transformer. In reality, the voltage across the transformer depends on the kinds of transistors and blocking diodes used in the amplifier. When the transistors are MOSFETs, the losses in the drain-source resistance can be very low. In newer devices the drain-source resistance  $R_{DS}$  is as low as 30 mΩ and drops less than 0.3 V even when drain current is 10 A. When the blocking diodes are Schottkies, the total drop will be less than 0.6 V.

While common emitter bipolar transistors could be considered, their storage time tends to be long when saturated and limits the frequency that can be used. Emitter followers are fast enough because they do not saturate. Unfortunately unsaturated means their collector-emitter voltage is a volt or so. In many SMPs emitter followers are used and the losses accepted.

Switch mode power supply controllers are available as ICs that are reasonably priced. The ICs are very similar even though the methods of implementation may vary and some extra bells and whistles may be included. Fig. 5 shows the Motorola TL494, a basic PWM controller IC.

The TL494 has two error amplifiers, a dead band amplifier, a regulated 5 volt reference voltage, an on chip oscillator, a PWM, and two uncommitted bipolar output transistors that can supply 200 mA. Since both emitter and collector are uncommitted, the transistors can be used as either common emitter or emitter followers. All this in a 16-pin DIP. Unless you just like to build things, the IC is the way to go. Still, understanding what each of the functional blocks in the IC does will give a much better appreciation of how to apply the IC to your particular needs.

The extra error amplifier can be used to shut down the supply when there is an over current or the voltage exceeds some preset values. In the figure, pin 13 OC is the output control, a high enables the supply. The dead time controls the maximum duty cycle the power amplifier can have and is controlled by the voltage on pin 4, the minimum dead band occurs when pin 4 is grounded. The compensation network between pins 3 and 4, 33k and 0.01 μF, reduces the error amplifier gain above 3 kHz.

The internal oscillator is controlled by the  $R_T$  at pin 6 and  $C_T$  at pin 5. The oscillator frequency (twice the output switching frequency) is approximately  $1.1/R_T C_T$ . For an oscillator frequency of 200 kHz  $C_T$  can be 1000 pF and  $R_T$  is 5.6 kΩ.

The diodes D1 and D2 are

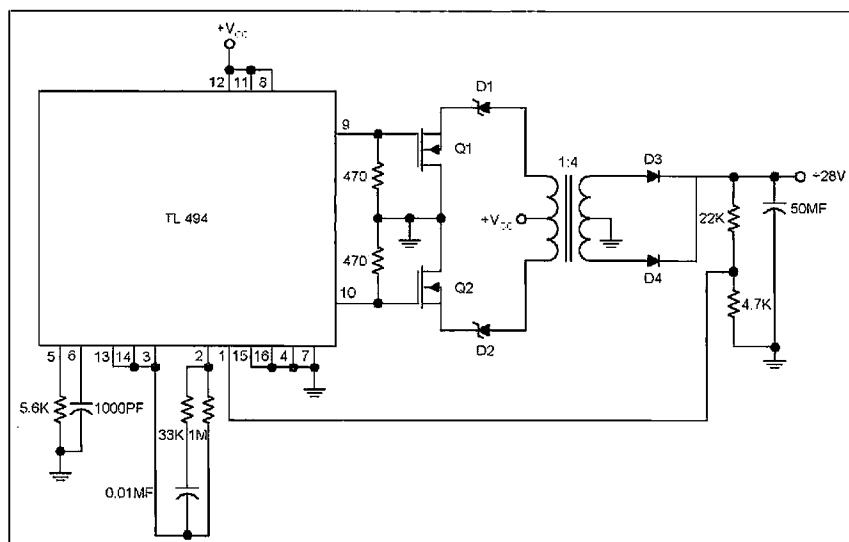


Fig. 6. A TL494 controls a 28-volt 1-amp power supply.



# Vent-a-Fume

*This project has produced more than its share of fans.*

*The weekend was here, and I had plans to spend the entire time planning and building a QRP project worthy of national acclaim! I could almost hear the DX returning my call with, "599, OM, sig FB hr QTH — (insert your own rare DX desire here)." But reality burst the bubble of dreams, when I remembered that today was the day I had promised to "clean up" all that junk in the cellar.*

**G**ads, what an ugly thought! There's got to be the proverbial "ton" of stuff down there.

We (I mostly) hate to throw things away, surely there has to be another use for most of it. And what it cost when it was new! It's like throwing away an investment! No matter that the technology has entered the "Dark Ages."

Hefting "stuff" into the trash pile was going good, until my old 286 computer surfaced. The "mental light bulb" began to glow. Hey, now there's an idea! Why not use the fan as a "ventilator" to move the soldering fumes away from the bench while building projects! It has a twelve-volt DC motor, and the power supply to operate it is the "heart" of the building project. Hot stuff! I love it when work becomes fun, and trash turns into another valuable ham radio project!

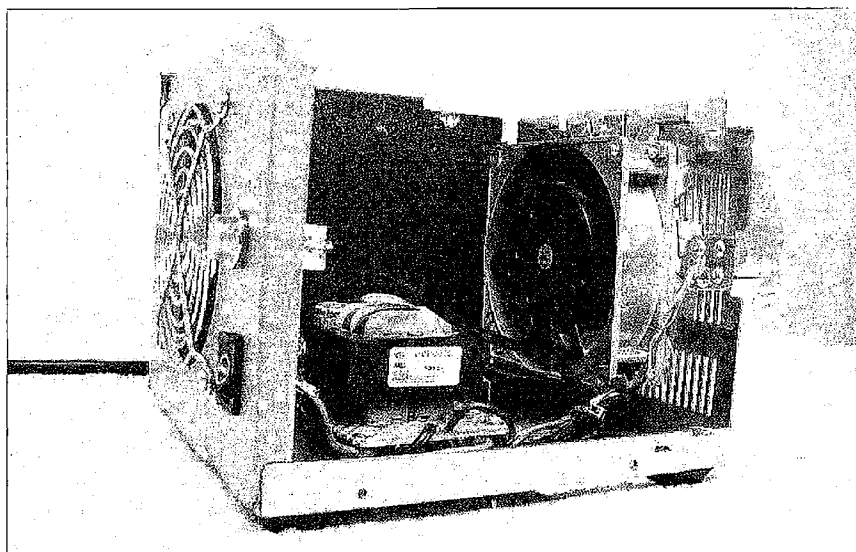
The "plan," as it were, was to create a device to remove solder fumes from the workbench area to a nearby window, where they would be released. The ventilation fan used in the computer power supply is a 12-volt DC model; a small fixed voltage supply would be required to operate it. The original supply, while functional, was

deemed "overkill" for this project. The finished product should be functional and have a "finished" appearance.

The most difficult portion of this project is locating a suitable exhaust connector and cutting the hole necessary for mounting. A trip to the local homeowner store provided a four-inch galvanized connector called a "starting collar" (\$2.90). It was found in the area serving clothes dryer tubing, etc.

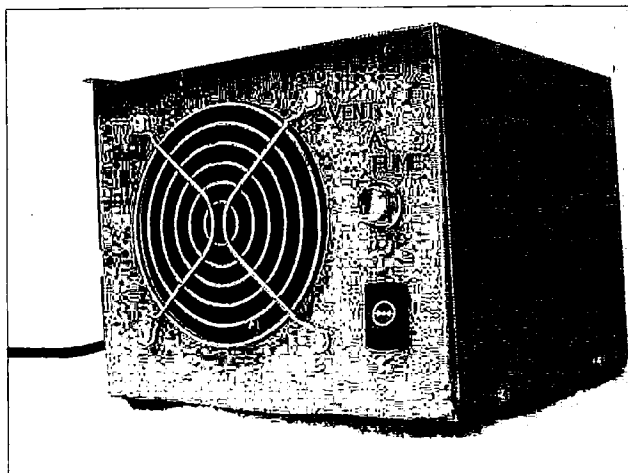
The connector has "tabs" for bending on one end and allows tubing to be attached to the other.

After emptying the power supply of all parts, use the "starting collar" as a template and trace its outline on the rear panel. I used a "nibbler" to cut the four-inch hole for the collar. Next, place the fan squarely over the four-inch hole and mark the location of the four mounting holes of the fan. I

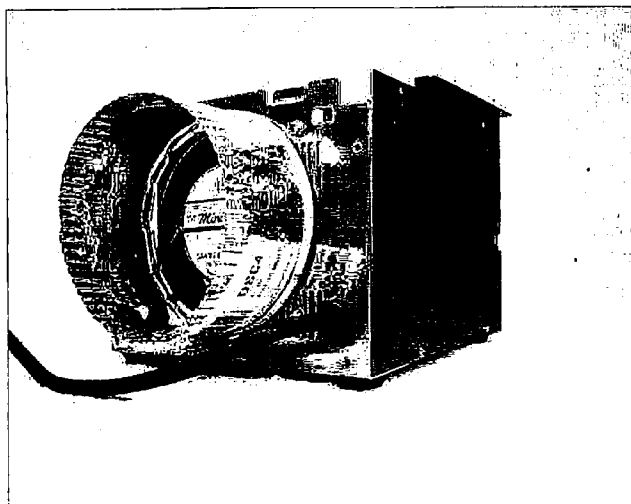


**Photo A.** The fan is positioned to the rear of the cabinet to facilitate optimum air flow.





**Photo B.** This front panel has been finished with shelf liner paper rather than paint.



**Photo C.** Rear view.

moved the fan from its front location in the cabinet to the rear, to facilitate a more positive flow of air through the flex pipe and to provide cooling for the new 12-volt power source. Then I drilled the four holes to mount the fan and also drilled a suitable hole to mount the strain relief for the 115 VAC power lead (see **Photo A**).

To mount the collar, insert the tabs into the four-inch hole and bend them over. I used a small hammer to bend the tabs securely against the sheet metal housing. Before mounting the fan inside the chassis on the rear wall, check for desired rotation. The fan should "draw" air from the front to rear, and not blow air into the room. My power supply fan was mounted "off center" on the front panel, thus leaving a wide metal portion for mounting the power switch and indicator lamp.

After marking and drilling these holes, I checked for proper fit of the

switch and lamp. The front panel of my project is not painted, but has a covering of adhesive-backed "shelf liner paper" available at department stores in the housewares department. When you build this project, you can paint or apply shelf paper to the front panel as desired. The paper can be easily removed from the front "intake" hole, switch, and indicator holes using a razor knife. This is a good time to apply labeling if you desire it (see **Photo A**).

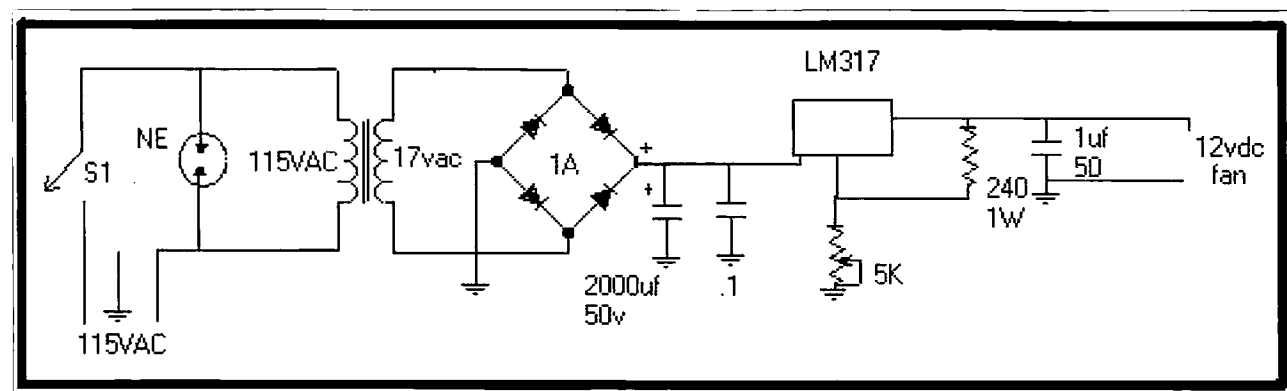
Mount the switch, AC indicator, and front wire form fan guard. The outer panels of the chassis, a flat panel and an "L"-shaped piece will be visible when assembled. I painted them with primer and Rust-Oleum Hammered Metal Finish. This paint dries to a "dimpled" finish, looks good, and is excellent for covering blemishes.

A 12-volt DC power supply to operate the fan has been described many times. A schematic for a suitable one is

shown in **Fig. 1**. All parts were salvaged from the original power supply. Your "junk box" may have to supply parts not available from your particular device. See **Fig. 1**.

Using threaded spacers, mount the new power supply, taking care to allow room for the protruding switch, indicator, and fan. Marking the location of the threaded spacers to facilitate drilling the holes is a "snap." With the spacers attached to the power supply board in their final location, paint the bottom of the spacers with red nail polish. While the polish is wet, place the board "gently" into position inside the cabinet. Remove the board, and the wet polish will have left "doughnuts" where the necessary holes are to be drilled for the screws. The polish is easily removed if desired. Attach suitable rubber feet to the bottom of the

*Continued on page 58*



**Fig. 1.** 12 VDC power supply. Adjust for 12 VDC output. NE = salvaged neon indicator; S1 and bridge rectifier also salvage.



# New Life for a Pierson KE-93

Part 2 of 3.

Part one of "New Life for a Pierson KE-93" discussed the power supplies that were sold as companions with the receiver during the 1957 era. All of the identified problems that I had discovered were also listed, and each will be discussed in the appropriate section as we proceed.

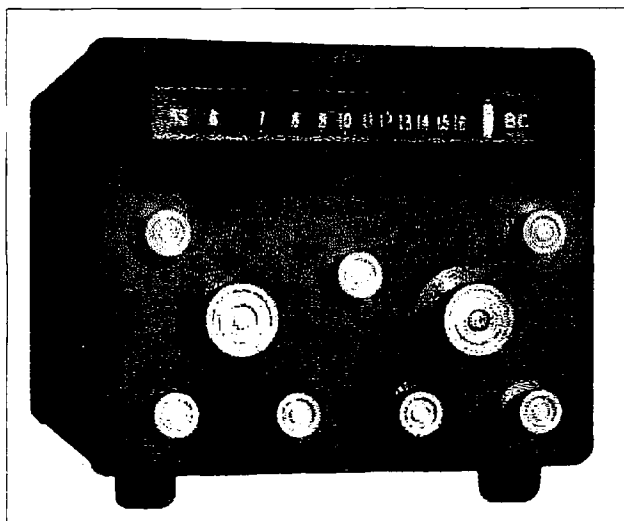
The objective of my involvement with this receiver project stemmed from an early fascination with Pierson receivers, even though I'd never used one. Perhaps the compact design captured my attention, since this receiver was physically different from competing receivers of the period.

Again, let me emphasize that the Pierson KE-93 ham band communication receiver was ahead of its time in

design technology and performance (see **Photos A and B**). During the early 1950s era, Standard Coil developed a turret tuner for the front end of TV sets that revolutionized the industry. Until the advent of the turret tuner, channel frequency stability and poor RF sensitivity were very common problems. Service technicians had a real battle on their hands attempting to fix TV problems — then along came the Standard

Coil turret tuner and we all sighed with relief at last.

Pierson took advantage of the Standard Coil-style TV tuner design and placed one in the front end of the KE-93 (see **Photo C**). As a result, the RF lead lengths were shortened considerably and the coil Q factor was increased, improving both RF sensitivity and input selectivity (see **Photo D**). Of course, the mechanical stability

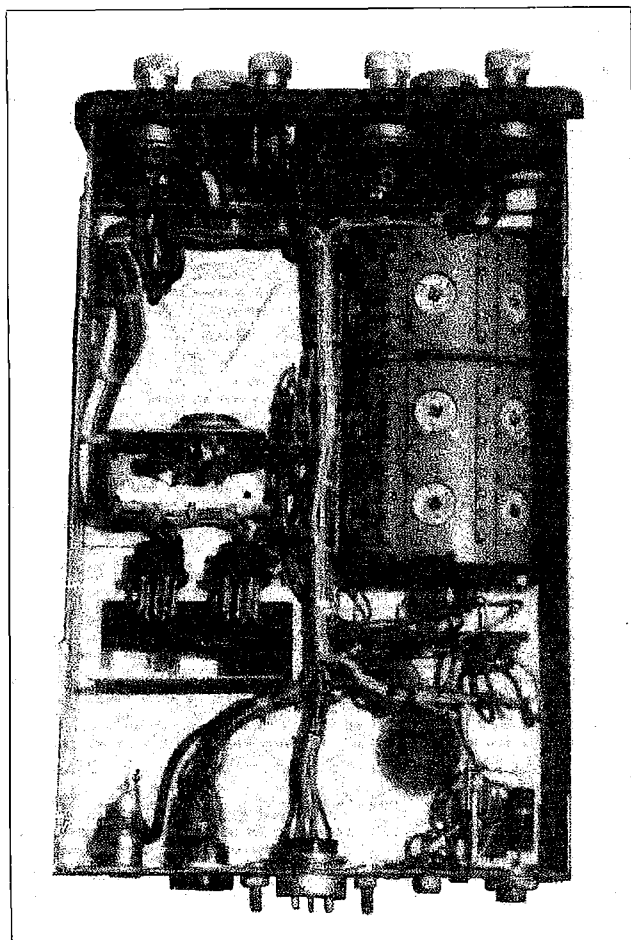


**Photo A.** Front panel view of the Pierson KE-93 communications receiver.



**Photo B.** Rear cabinet view of the receiver showing the connectors.

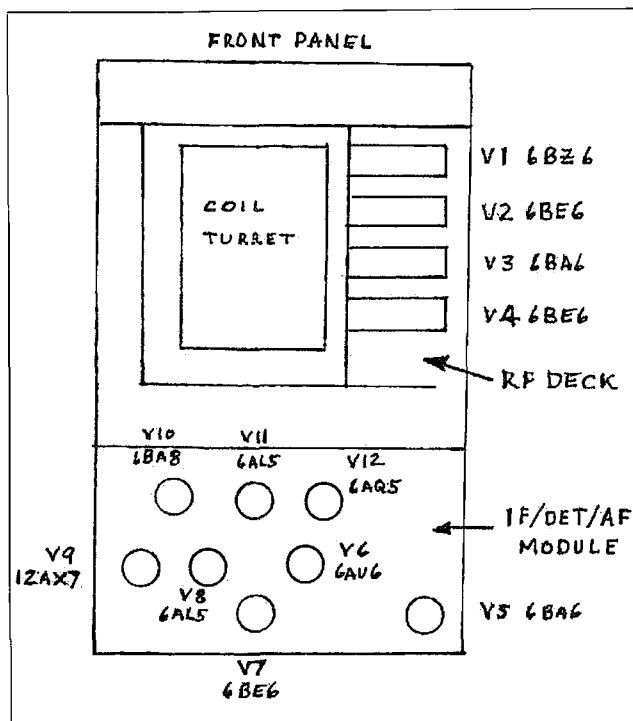




**Photo C.** Inside bottom view of the receiver showing the wiring harness and the coil turret.

of the front end was vastly superior to competitive receivers.

The entire IF detector, noise limiter, squelch, and audio were packaged into



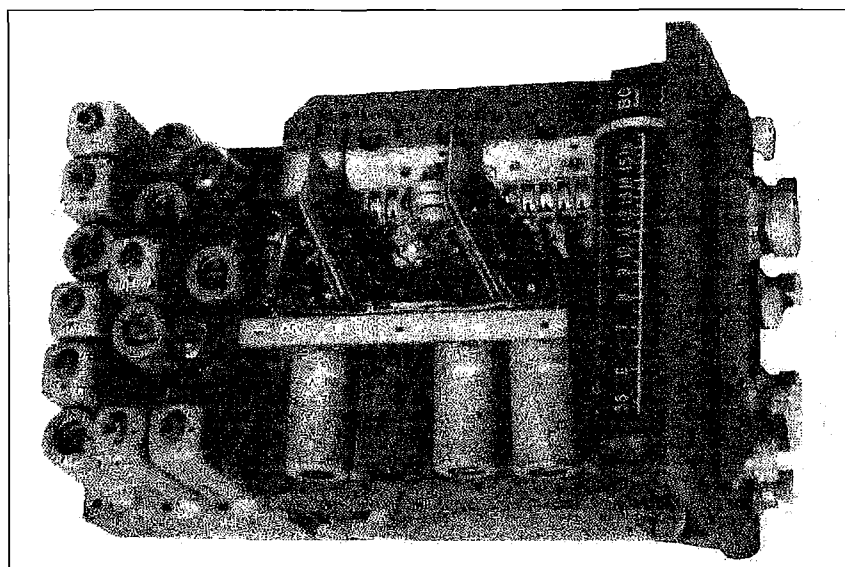
**Fig. 1.** General layout of the Pierson KE-93 receiver.

Another mechanical advantage engineered into the KE-93 was a partial modular design. **Fig. 1** shows the general layout of the receiver.

one small module and placed on the back porch of the receiver. When mounted, the IF system was fully RF shielded, protecting it from stray RF noises and signals.

One disadvantage of the compact design was aftermarket troubleshooting. Because of the modular design and the way things were mounted, a technician could not easily measure voltages at the socket of the IF tubes. Only the front-end tube sockets pins were readily accessible for voltage measurements.

As noted in **Photo E**, all of the resistors used in the IF module are mounted on a terminal strip running the length of the chassis. Therefore, checking resistor values in the IF module is reasonably easy. Nearly all of the disc ceramic capacitors are accessible for changing should that be necessary. But to measure voltages at the tube socket pins, an independent test station with a power supply would be preferred. **Table 1** shows the resistance values that I measured at the socket pins of each tube within the receiver. Tube basing diagrams shown in **Fig. 2** provide a function reference as an aid during troubleshooting.



**Photo D.** Inside top view of the receiver showing the dial drum, coil turret connections, and compact design. Note the short lead lengths used in the front end.



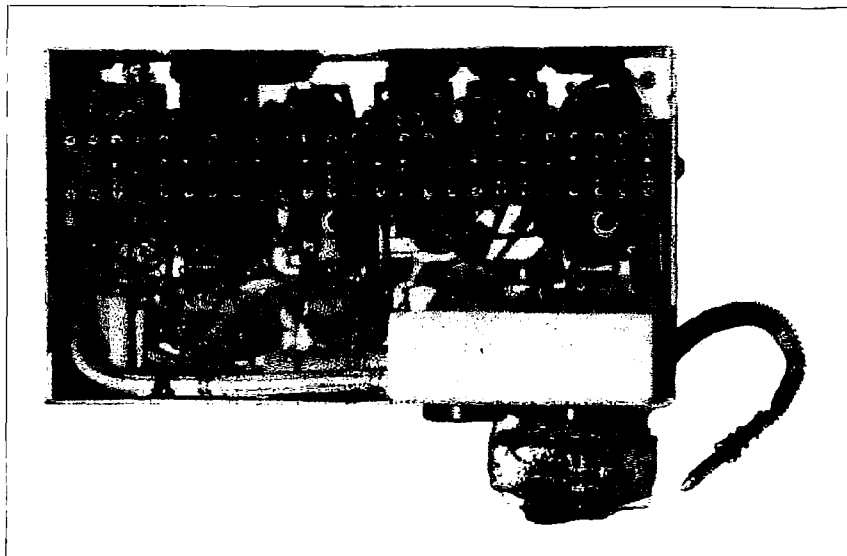
## Receiver

Having not previously looked inside a Pierson receiver I felt it was necessary to work up a signal path diagram, as shown in **Fig. 3**, so that I'd be able to examine and troubleshoot the receiver should repairs be required. During this part of the analysis, I discovered that the KE-93 is a double conversion receiver for the 80–10 meter bands and single conversion for broadcast and 160 meters. Conversion switching takes place by activating two microswitches with a lobe on the coil turret. Two switches are required, with one of them switching the signal from the first mixer into the second mixer or bypassing the second mixer and going straight into the IF. The second switch selects output from either the second mixer or from the first mixer.

Once I got the receiver operating, I measured the conversion frequencies and found the IF centered at 265 kHz. The crystal used in the oscillator of the second mixer operates at 2.465 MHz, causing the output from the first conversion to be 2.200 MHz. At 2.200 MHz, the image is pushed out to 4.4 MHz away from the desired input signal, reducing the amplitude of any image signal to something negligible. With the image on the high side of the input signal, it is further reduced in amplitude.

A further analysis of the IF module revealed that the noise blanker circuit is very similar to the Lamb design. During the 1950s era, noise limiters used in most ham receivers were of the series and/or shunt pulse noise gate types. Although quite effective, there was always a noise "stump" remaining after being clipped, and this residual noise stump was audible. In addition, when listening to an AM signal, some peak audio clipping took place and the user could actually hear distortion on the resulting audio signal.

Using the Lamb design, there was an increase in noise rejection as well as the elimination of all audible distortion as a function of noise blanking. Audible noise stumps were eliminated because no noise stumps are produced by the system. **Fig. 3** shows the design features of the noise blanking system



*Photo E. Bottom view of the IF module showing both the compactness of the design and the availability of the resistors for troubleshooting purposes.*

used in the Pierson KE-93. A tuned circuit operating at 265 kHz feeds a noise amplifier whose output is rectified to a DC voltage value. The amplitude of the DC voltage is a direct function of the noise level within the IF signal path. Once developed, the noise-generated voltage is fed into the last IF amplifier, causing an instantaneous reduction in stage gain during the noise duration period. A damper diode was added to the KE-93 circuit to prevent an overcompensation as a result of noise pulses.

Squelch was another feature designed into the KE-93. I'm not aware of any other 1950s AM ham band receiver that had squelch. Of course, it was easy to implement in the KE-93 once noise rectification was performed as it is typically done in the modern ham and commercial FM radios. White noise within the IF path decreases as a function of the received signal strength. Utilizing that feature, the derived DC noise voltage is used to control an audio gate. A pot on the front panel of the KE-93 allows the

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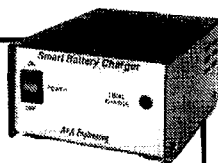
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Tube	1	2	3	4	5	6	7	8	9
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V2 6BE6	55k	500	—	—	8k	51k	0		
V3 6BA6	17k	0	—	—	9k	32k	0		
V4 6BE6	49k	600	—	—	14k	110k	∞		
V5 6BA6	∞	0	—	—	65k	38k	∞		
V6 6AU6	0	0	—	—	65k	120k	300		
V7 6BE6	∞	1.7k	—	—	65k	120k	470k		
V8 6AL5	0	1M	—	—	1.6k	0	270k		
V9 12AX7	173k	∞	∞	—	—	∞	48k	0	—
V10 6BA8	∞	∞	1M	—	—	∞	5M	60k	60k
V11 6AL5	1M	470,	—	—	0	0	470k		
V12 6AQ5	470k	330	—	—	60k	60k	470k		

**Table 1.** This chart shows the resistance measurements that I obtained from one receiver. Resistance values for the IF module were taken with the module removed from the receiver.

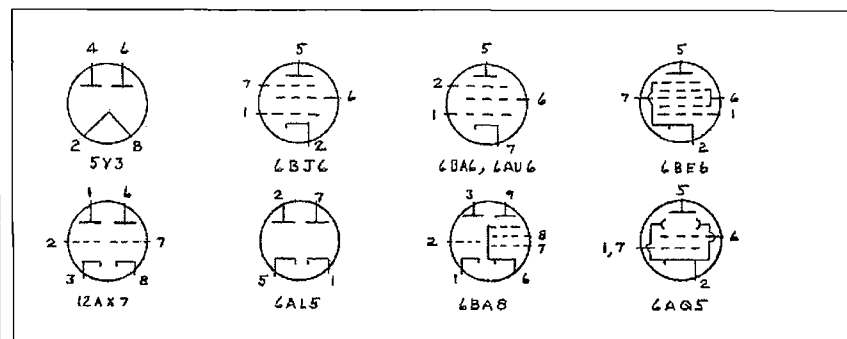
user to select the signal threshold for squelch operation.

## Dial cord

After getting power applied to the receiver, I had started to perform some tests, when the dial cord jumped out of one of the pulley grooves. So what happens now! Upon examination of the situation I found the compact design was actually a hindrance to working with the dial cord. I hesitate to think of having to replace the dial cord, but decided it would be proper to prepare for the event should it occur.

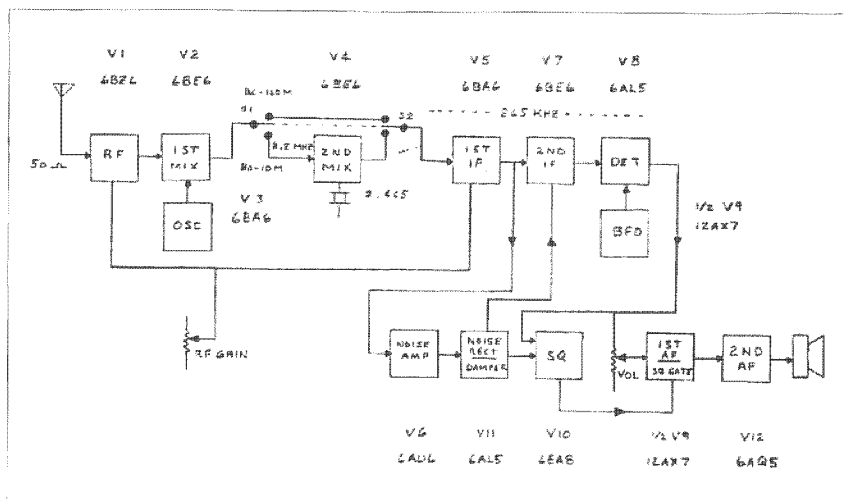
**Fig. 4** shows the dial cord stringing pattern that can be used as a guide should replacement become necessary.

Here is what happened: As I rotated the tuning knob from the low frequency position toward the high frequency end of the dial, the cord jumped off of one of the idler pulleys. Getting the cord back over the edge of the pulley without nicking the cord was a real challenge requiring an abundance of patience. I ended up using a pair of thin, long-nosed pliers to stretch the cord's tension spring end toward the opening on the tuning



**Fig. 2.** Basing diagrams for all of the tubes used in the KE-93 and base power supply.





*Fig. 3. Block diagram showing tube functions and the signal path for the Pierson KE-93 receiver.*

drum. This action provided sufficient slack in the cord such that I eventually managed to place the cord where it belonged.

Of concern during this operation was that the spring, pulley, or dial cord should incur no damage. Holding and pulling on the cord to slide it over the edge of the pulley was pretty tricky since I had only a smooth, thin-shafted screwdriver and a round toothpick as working tools. Later, I realized that I could probably have used a paper clip stretched out with a small hook formed on one end. Hopefully I'll never have to find out if that would work.

The biggest problem was the lack of working space for the pliers, my hands, and the toothpick. It was at this point that an abundance of patience was required. There was a loud sigh of relief when the cord dropped over the edge of the pulley. But now I thought

about having to repeat the process, unless I took the necessary action to prevent it from happening again.

With the cord in place, I carefully rotated the tuning knob while watching the pulley shown with an arrow in Fig. 4. As the knob was rotated, the dial cord walked along the knob shaft away from the pulley, causing the cord to ride up and over the edge of the pulley. Of course, I stopped rotating the knob once I detected the problem situation. How to "fix" the problem was the real question. Through observation I noted that the knob shaft was badly corroded, causing the cord to stick to the shaft when some slippage would be normal. I also noted that the edge of the pulley was corroded and that the corrosion was grabbing the cord and lifting it up to the pulley's edge, allowing the cord to jump over.

The following indicates the steps that I took to alleviate the cord-jumping situation:

(1) The accumulated rust and corrosion on the knob shaft had to be removed, but the dial cord was in the way. Yet, the shaft needed to be polished without damaging the cord. To gain access to the majority of the shaft, I rotated the dial to one end of the band, allowing the dial cord to walk toward one end of the shaft and exposing nearly half of the shaft. Using a pencil eraser, I worked on the exposed corrosion until the majority was either removed or polished. Rotating the

knob shaft in the other direction walked the dial cord to the other end of the shaft, providing access to the corrosion on the other half. While rotating the knob shaft, I made sure the cord stayed within the pulley groove because I didn't care to repeat the cord stringing operation.

(2) While working on the knob shaft, I noted that the edge of the pulley was corroded and needed to be cleaned. The pencil eraser didn't seem like an appropriate tool, so I used my fingernail as a file. Rotating the knob shaft caused the pulley to rotate, allowing the edge of my fingernail to scrape along the inside edge of the pulley. Nearly all of the roughness was removed after a few minutes of that action.

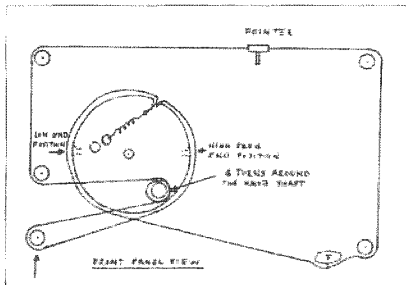
(3) To reduce the tendency for rusting and to lubricate the dial cord's path, I used a small amount of beeswax. The wax was rubbed onto the knob shaft, into the pulley grooves of all pulleys, and along the dial cord where it rode in the pulleys.

The "fix" appeared to stop the tendency for the cord to ride up and over the edge of the pulley, and I've had no further trouble with the cord.

## Next steps

Part one of this series examined the Pierson KE-93's companion power supplies and began the preparation for power application to the receiver. Part two continued the preparation and began addressing some of the identified problems, including the jumping dial cord. At this point in the process, the receiver was not yet operational.

Part three will continue my experience with the Pierson KE-93 receiver and the steps that were taken to make it operational. Included will be discussion on how it was tested and how well it performed.



**Fig. 4.** Dial cord stringing diagram for the KE-93 receiver. The arrow points to the pulley most likely to cause the cord to jump.

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# Travels with Henryk — Part 3

*East meets West in the north.*

*In this sometime world of conflict and hatred, there is a secluded place north of the city of Stockholm, Sweden, where international friendship through amateur radio thrives. This place is called Kvarnberget (The Mill Hill), and on top of the hill a radio club has its site.*

The callsign of the radio club is SKØUX. It is already well known in Sweden and in many other countries as a synonym for unprejudiced and boundless friendship between people of different backgrounds, nationalities, social status, and approaches to our hobby. A few of them are devoted HF contesters, while others consider anything under 1 GHz as

low frequency. Some will design multi-element arrays, while others still don't know how to build a dipole. Some will utilize the latest technology and computer techniques, while others still don't know the front from the back of a directional antenna. But there is room for everyone here.

Looking through the members' list, you'll discover people of different

ages, professions, and places of birth. Traditional Swedish tolerance and hospitality, a long history of neutrality, and verified experience in solving international disputes bear fruit in the shape of a very successful and active amateur radio club. This is a natural meetingplace for foreign hams visiting the capital of Sweden.

Though not common, this approach



**Photo A.** David WB6RAB/SMØXEU at the rig, with Martin OK1FMD/SMOWYB.



**Photo B.** WB6RAB with Pontus SM1BBI.





*Photo C. Maciek SQ9DDD.*



*Photo F. Fabian DJ1YFK.*

is not unique. At last year's World Expo in Hannover, Germany, visitors

to the Swedish pavilion were entertained by a band of musicians coming from north and south of Sweden, North and South America, Africa, Asia, different continents, cultures, and backgrounds, yielding a rich blend of human contemporary sound. All the musicians had one thing in common: They made Sweden their home.

A joint effort in Kvarnberget by hams of various backgrounds and methods of practicing our hobby can produce a place of outstanding features and opportunities — a place that will convey hope for the future.

The photos show only a glimpse of last year's (2000) visitors and foreign members of the club using, or sometimes only admiring, the facilities. The facilities consist of a metal sheet-clad house with half a dozen operating positions, and at least 9 towers carrying a variety of radiators, all of it on a fenced half-acre lot surrounded by pine and birch. Some of the antennas

are exceptional, some are average. However, the overall standard is definitely



*Photo D. Waldemar SM0TQX and WB6RAB.*



*Photo G. Teemu SM0WKA, Jorgen M0AXP/OZ3CF/PA1CF, and Goran SM0DRD.*



*Photo E. SM0TQX and Roman US5WDX.*



*Photo H. Kamal 4S7AB.*





Photo I. Carlos CX7CO and Ramon XE1KK.

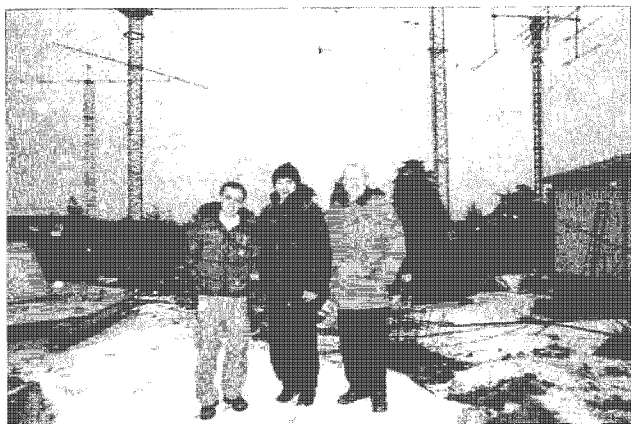


Photo J. Piotr SQ5RTM, US5WDX, and SM0TQX.

higher than average, and the antennas are worth seeing with your own eyes.

One purpose of this article is to encourage anyone passing by Stockholm or its vicinity to stop and visit Kvarnberget and mingle with locals and other visitors; use the antennas to create a pileup; or just talk to your own neighborhood. Experience and practice friendship through amateur radio. The other is to open the eyes of those who limit their amateur radio engagement to owning an expensive station, exchanging 5x9, and knowing nothing about the outside world.

The world is shrinking, and I myself find it extremely enlightening to meet hams in foreign countries. I feel as though I have an advantage over the average tourist.

The most spectacular visitor to Kvarnberget I met last year was Jorge LU6AF. While in Paris, France, he took a quick flight to Stockholm. One of the club members picked him up at

the airport and drove him to the club. Jorge looked at the installations, made a few contacts with his home country of Argentina, and then off again to the airport to catch a flight back home. I guess he was impressed, but we were as well impressed by his curiosity.

The number of licensees in the world is increasing, yet very few of us can really handle the technical and experimental aspects of our hobby. We merely use the equipment and technologies developed and manufactured sometimes as by-products. Let's put them to use against the increasing international tension — let's make real friends.

Obviously, no group of people is homogeneous, so if you visit this radio club enough you are bound to meet individuals who won't say "hello" to you, who will never accept you as a fellow ham just because of the color of our skin or our native language. No society is free of such obsolete behavior

patterns. It can be annoying among hams who, by definition, experiment with radio waves in order to talk to people of different races and nationalities, people born in distant places, and the further the better. Let's hope that that old spirit of non-acceptance is a dying phenomenon.

All you peace negotiators, interracial crisis advisors, anyone with such impossible tasks — heed the guys of Kvarnberget: There *is* a solution.

Before coming here, check the Web page of the club at [<http://sk7do.te.hik.se/clubs/~sk0ux/>] for information on how to contact the management of the club. Welcome! 73

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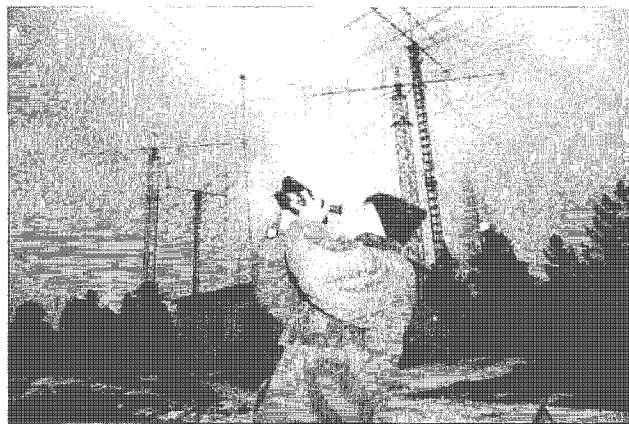


Photo K. US5WDX.



Photo L. SQ5RTM, SM0TQX, and US5WDX.



# One Repeater to Go, Please!

*Another emergency tip from 73's Disaster Master.*

*If you have ever worked disaster recovery or damage assessment, you know how challenging conditions can become. Often travel into and out of the disaster area is limited. Loss of power means that traffic signals may be inoperative and gridlock often ensues. Once you get to the actual disaster area, roads may be impassable for vehicles, so travel throughout the area must be accomplished on foot.*

While this may not seem particularly daunting in and of itself, it also means that the high-powered mobile rig with a gain antenna in your car is of little use. Ham operators assisting in these situations may be limited to hand-held radios with their inherent limited range.

In general, hobby use, handhelds perform fine because repeaters expand the area of coverage in almost all metropolitan areas. Unfortunately, disasters do not limit their occurrence to locations with good, reliable repeater coverage, so you may find yourself on the edge of repeater coverage, or a repeater may not be available.

There are some common tricks to help out in this situation — using a telescoping or 5/8-wave antenna will give better performance than a rubber duck antenna, as will a “Tiger Tail” or similar extension of the counterpoise. Gel cells mounted in a fanny or belt pack will extend operating time on high power well beyond the capacity of the handie-talkie’s internal battery packs.

Some hams may carry a small mobile rig in a shoulder pack to provide higher power, but once again, this is limited by the capacity of the battery

you are willing to carry. A larger radio and battery may not make a noticeable difference when you first start out, but over time the weight can become quite noticeable.

But even if a repeater is available and operational, what is the assurance that the repeater will be operational for as long as necessary? While many repeaters have emergency power available, the type of emergency power will determine how long the repeater can remain in service. If the repeater is able to switch from commercial electrical power to battery operation it will continue to operate for some period of time. The duty cycle of the repeater will dictate the length of time the batteries, and therefore the repeater, is available. Some repeaters can be switched into a power saving mode that eliminates all but the most basic features.

The biggest use of power will always be during transmitting, so elimination of features, while helpful, is not going to address the main problems. The more transmissions made through (and therefore by) the repeater, the faster it uses up its available power. If it is possible to drop the repeater into a lower transmitting power output without compromising required coverage, this

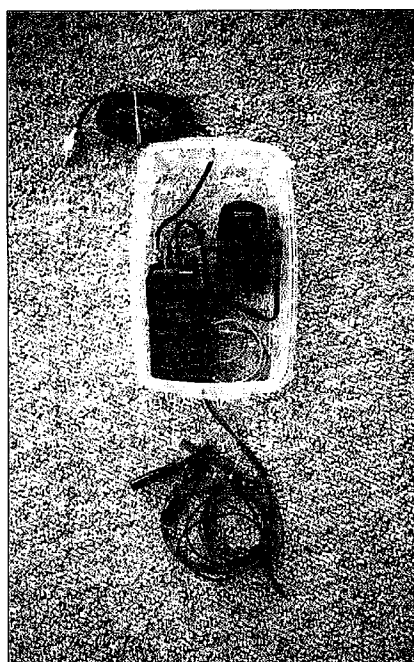
can play a significant role in extending its life.

Some repeaters may be located at a hospital or similar facility and may be tied into their emergency power. Hospitals often have very large generators to ensure that essential equipment such as life support can be maintained for long periods. Since hospitals play such a pivotal role during almost all disasters, the presence of a repeater is consistent with their mission and may actually prove an advantage to the hospital itself during the rescue phase of operations. But even if you are lucky enough to have a repeater which continues to operate reliably and which has coverage into the disaster areas, there may be other considerations.

If the operational repeater is the main (or only) communication link supporting the area, it can quickly become clogged with traffic from hams assisting in the operation. As hams compete for access to the repeater with a variety of critical traffic, it is not uncommon for some operators to have to resort to calling “Mayday” to break in with traffic that must be passed immediately.

The obvious answer is to bring an additional repeater into the area to operate during the disaster support





*Photo A. The finished unit sits inside a plastic food container.*

efforts. Now as anyone who has worked on their local ham club's repeater knows, a repeater can often involve a number of major pieces of equipment. A typical repeater may be constructed from two commercial radios, a repeater controller, power supply, duplexers, and a large antenna. Commercial radios are favored because they can be expected to provide

long, reliable service. They are normally built for durability with only minimal features.

This simplicity adds to their durability, since every horn, bell, and whistle added to a radio can make the system more prone to problems. On the other hand, commercial radios built to take a punishment are often large, with heavy protective cases.

A repeater controller may have many features and also take up a fair amount of room. It ensures that when the receiver hears a signal and the squelch opens, the other radio's transmitter is activated. The controller allows the repeater to be controlled by the repeater trustees either through a radio link on UHF, by telephone line, or by other means. It has a timer which halts retransmission after a predetermined period of time, and many repeaters include a courtesy beep which indicates that the timer has reset and it is okay to begin the next transmission.

The repeater also identifies the station at appropriate intervals and may include a phone patch to permit telephone calls to be made through a handie-talkie or mobile rig. The duplexer, which looks like two large metal cans, is a tuned cavity that permits one antenna to be used to simultaneously receive on one frequency while transmitting on another. They

stand about two-feet high, have thick walls and are not especially portable. Finally, there is the antenna, which may be ten feet tall and designed to provide coverage for a very large geographic area. Bringing a standard repeater into a disaster area is not an easy task.

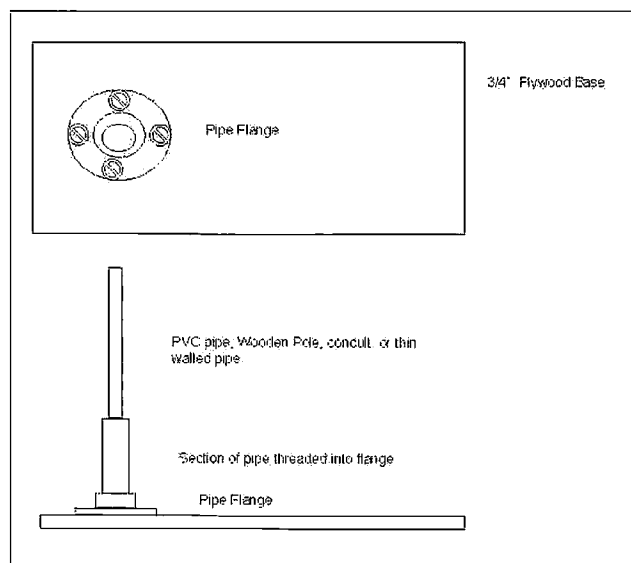
Some of the newer full-featured mobile rigs have the capability of acting as a repeater. While this can provide some

help, there are two problems which must be addressed. The first is that as a mobile rig it is necessary to bring a vehicle into the area and park it in an appropriate location. Since repeaters work best when located as high as possible, this solution could work if the road into the area is clear and if there is a hill located in the area on which the vehicle can be parked. Since Murphy's Law reigns supreme in a disaster, the chances of this happening are slightly less than me purchasing a winning lottery ticket.

One of the other issues with using a mobile rig as a repeater is that most are set up to be a crossband repeater. This means that the repeater can receive on a UHF frequency such as 440 MHz and transmit on two-meter VHF or vice versa. Obviously, this means that everyone working in assistance for the area would need to be using a dual-band radio. Unfortunately, since cost is a factor for many hams, single band 2-meter handie-talkies are by far the most common rig out there.

Sometimes the best answers are the simplest. Since the earliest days of amateur radio we have used relay systems to pass messages beyond the transmitting range of a single operator. Relaying was used by primitive people on almost every continent to pass signals by smoke, banners, and other means, so adapting it to radio was a natural evolution. The American Radio Relay League takes its name from this practice when an amateur radio message would be transmitted, received, and, by retransmitting the message, relayed on to the next geographic area. The National Traffic System (NTS) and the Military Affiliate Radio System (MARS) use this technique on a daily basis.

Because there is the chance to introduce errors into a message while relaying it, various methods have been used to minimize changes in the message itself. Word counts ensure that the number of words in the text don't change. Common messages are assigned a number which is relayed from station to station along with delivery instructions. When the numbered message reaches the final receiving station, that operator converts it back into the standard



*Fig. 1. A handy emergency antenna base can be constructed as shown above. A car is parked with one wheel parked on the plywood base which makes the base very stable. The antenna is attached to a lightweight pole which fits into the pipe attached to the base.*



message and delivers it to the intended recipient. While this form of relay works well for many types of traffic, it would be overly cumbersome in a disaster situation.

What is needed is a combination of relay and repeater that is portable, can be located in an appropriate area quickly and easily, and will reliably support the communications need. This means that it should be easy to transport, simple to assemble, light enough so it can be carried to the highest available location, and be able to operate for a long time from a relatively small power supply. Even in this microcomputer-driven, surface mount technology miniature electronic age this may seem to be a tall order, but such a system can be built easily and implemented with a minimum of effort in the field.

The device that meets our requirements in this situation is called a simplex repeater. They are sometimes referred to as a "parrot repeater" because of the manner in which they work. A simplex repeater operates on a single frequency. It consists of a digital recording device and a timed transmitter switch. There are commercial units available, although given its simplicity you may decide to design your own version of the unit.

The simplex repeater is usually designed so that the digital recorder senses a signal on the receive circuit of a radio and switches the digital recorder on. This is essentially a voice-operated switch (VOX) which starts recording when it "hears" a voice. The unit records the message, up to the limit of its memory. After the recording stops, the simplex repeater then closes the push-to-talk circuit and plays back the message it had just recorded. The recording memory automatically resets and it is ready for the next transmission.

The radio's offset can be used so that the unit transmits on one frequency and receives on another, but most people set it up as a simplex unit. Standard repeaters simultaneously receive on one frequency and transmit on another while the simplex repeater can only perform one of these tasks at a time. I personally prefer using a simplex frequency because in a disaster

situation you may often hear the signal directly which catches your attention, then you hear the message repeated. The repeated message should be clearer if the repeater is properly located, so this works out quite well.

In my case, I wanted to have a small but durable package that would be self-contained and yet provide a satisfactory signal. For the radio I decided a 5-watt signal would be the optimal power level and I wanted to use a radio which provided standard connections for the antenna, power and simplex repeater. The obvious choice was the Alinco DJ-195, which meets these requirements and is a substantially constructed unit. The DJ-195 uses a standard microphone and earphone jack configuration that allows it to be easily connected to the simplex repeater. While the DJ-195, like almost all handie-talkies, has its own nickel cadmium battery pack, it also can accept a power supply providing 6 to 16 volts. Also, in this day of new types of

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antenna connectors, it uses a standard BNC connector.

The Radio Shack Simplex Repeater (Catalog No. 19-345) provides all of the features mentioned previously and is contained in a compact package. Although it can run from four internal AAA batteries, it will also accept an external power supply of 12 volts. Both the Alinco DJ-195 and the Radio Shack Simplex Repeater have been discontinued, so they can be purchased for a very significant discount.

The next step is to decide how to package the repeater. If I stick to my original premise, I'll want a package that is light, compact and durable. I do not need a case" in the traditional electronic construction sense of the word because each component is already in its own case. I do need something that would qualify as a weather-resistant enclosure, however, since disasters are notorious for occurring in and around poor weather.

Now, I've handled my share of military equipment that is rated for every

conceivable condition. The weather deck on a ship is exposed to, well, all kinds of weather, so equipment must be protected accordingly. However, although Congress gives money to the Defense Department, they generally prefer to take it from me, so my budget for enclosures is not quite on par with the government's. Besides, I tend to be just a little cheap by nature. So I needed something light, small, weather-resistant and, of course, cheap. The natural choice? A plastic food container such as you can find at a discount or grocery store. The lid is watertight, and if I carefully make an opening through which I pass all the cables, I can seal that opening with silicone.

I decided on two cables, one for the antenna and one for power. The antenna cable has a BNC connector within the box and a PL-259 on the outside. With a barrel connector, most any two-meter antenna can be quickly connected. For the power cable, I used 14-gauge wires with large alligator clips. This allows the repeater to be

powered by any 12-volt battery, including gel cells or an automobile battery.

To provide stability for the radio and repeater, 2-inch squares of Velcro were attached to the back of the case and the inside of the food container. It's best to put the softer portion of the Velcro on the electronic devices and the stiffer hook portion in the food container. This way you can still use the HT without catching the Velcro on everything. The finished unit is shown in **Photo A**.

I toyed with various ideas as to mounting the entire unit. I've seen some temporary antennas mounted on pipes to a piece of plywood in an "L" shape. In this way the mount could be set on the ground and a vehicle parked with one wheel on the board to provide a fairly sturdy mount (**Fig. 1**).

This works out well as part of the equipment in an emergency response vehicle, but is not convenient for carrying.

*Continued on page 58*

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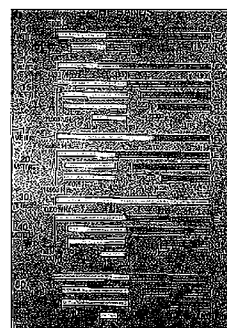
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# Understanding the CWTHA

*This technical reprint about resonant contrawound toroidal helixes  
is good food for thought.*

*Here, the resonant CWTHA is examined via a moment-method simulation. The results show a very high impedance at first resonance, with a narrow bandwidth and low efficiency. At second resonance, the resistance is less than an ohm, the reactance is zero, and again, the bandwidth is narrow. The azimuth patterns are not omnidirectional, but may have a dip of 10 dB or more. The simulation shows a loop-mode cancellation of at least 140 dB.*

The contrawound toroidal helix antenna has aroused considerable interest in recent years. The concept is simple: The two windings fed out of phase cancel the loop mode and augment the dipole mode, thereby providing a low-profile antenna that radiates an electric field normal to the plane of the toroid. As originally conceived by the inventor, Dr. Corum, the CWTHA was a resonant antenna — that is, it operated at a frequency where the antenna was resonant.<sup>1</sup>

A recent study<sup>2</sup> showed that, when the winding length is less than quarter wavelength, the current is approximately constant, and the pattern in the plane of the toroid is omnidirectional. However, it was shown that the radiation resistances for these small antennas were extremely low. The objective of this work is to examine the larger self-resonant CWTHA.

## Moment-method simulation

Although the exact vector potential solution has been written for the CWTHA, numerical integration is required to obtain numerical values. Here, the antenna is simulated via the moment method. The code used is the Tilston-Balmain bridge current modification of the Richmond piecewise sinusoidal Galerkin code.<sup>3</sup> Studies on single-turn loop antennas have shown that 12 segments per turn gives an excellent representation of a circular turn. Thus, the results discussed here are based on 12 segments per turn. The coordinates of the two windings can be written exactly in spherical coordinates.<sup>4</sup> The two windings have one common feedpoint. The number of segments for each winding is then 12 times the number of turns of wire around the helix. To obtain a preliminary idea of the performance of the resonant CWTHA, the two cases examined both have a ratio of toroid diameter to turn diameter of 10, and a ratio of turn diameter to wire radius of 20. This allows a reasonably fat wire, but assures convergence. A wire conductivity of 90% of that of pure copper was used. Because the matrix is poorly

conditioned due to the counteracting windings, all calculations have been done in double-precision complex.

## Results

Case 1 involved 20 turns. To avoid a multiple-parameter presentation, 100 MHz was selected as a realistic value, representing, in general, both HF and UHF effects. Of course, these antennas

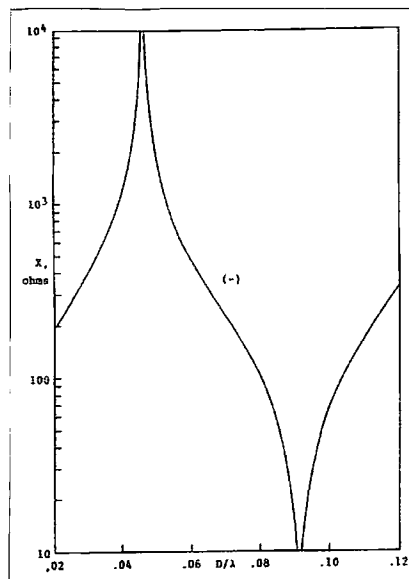


Fig. 1. Reactance for 20-turn CWTHA.



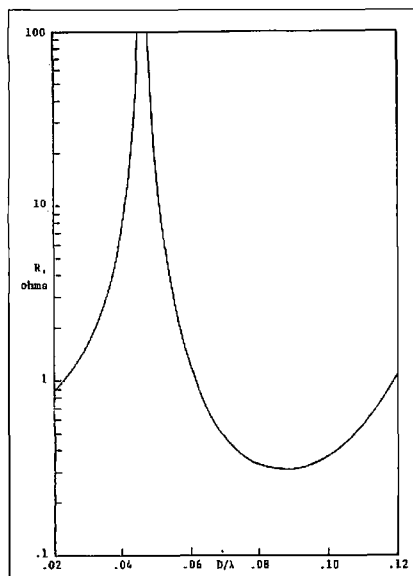


Fig. 2. Resistance for 20-turn CWTHA.

are of no use in the microwave region, where electrically small antennas are not needed. This case used 481 equations. One unknown couples the two windings. The loop-mode cancellation was 143 dB. Fig. 1 shows the reactance of this antenna for a diameter range from 0.02 to 0.12 wavelengths. It can be seen that the first resonance is extremely sharp and the  $Q$  is high. It occurs for a toroid diameter of 0.046 wavelengths. At the second resonance, toroid diameter of 0.091591,

the reactance is zero. Fig. 2 shows the corresponding input resistance, and again, the  $Q$  has increased the intrinsic radiation plus loss resistance at first resonance. At the second resonance, the resistance is varying slowly, and is roughly  $0.3\Omega$ . A calculation of  $Q$ , assuming constant resistance, gives a value of 1,635 there. It is interesting to note that the currents opposite the feedpoints are almost the same as those at the feed, with maxima at  $\pm 90^\circ$  points. This is probably because the structures, although resonant due to the winding, are still small in wavelengths. Fig. 3 shows a quarter of the azimuth pattern normalized to 0 dB at  $\phi = 0$ ; the other quadrants are images. Note that there is almost a 10 dB dip at  $\pm 90^\circ$ , so the antenna is not at all omnidirectional. The elevation pattern is closely that of  $\sin \theta$ . Note that, in the patterns, the  $z$ -component of the electric field is used, rather than the spherical coordinate component. The efficiency was less than 0.2% due to the small intrinsic radiation resistance. At second resonance, the efficiency was 7.4%, but matching losses, to match 0.3 to  $50\Omega$ , would decrease this significantly.<sup>5</sup> For a toroid diameter of 0.43821, the input resistance was  $50\Omega$ . However, the inductive reactance was  $3,000\Omega$ , which would provide a very

small bandwidth if matched with a capacitor.

Case 2 was similar, except that it employed ten turns. All other parameters were the same. For this antenna, 341 equations were used. The principal change is that first resonance now occurs for a toroid diameter of 0.09121, and second resonance occurs for a toroid diameter of 0.18081 due to the smaller number of turns. Again, both the real and imaginary parts of impedance are very sharply peaked at first resonance, indicating a high  $Q$ . The efficiency is roughly 1%. The reactance is also rapidly varying at second resonance;  $Q$  was calculated to be 2,300. The efficiency there was higher, 30%, but the small resistance of  $0.3\Omega$  makes matching very lossy. The azimuth pattern is flatter, showing a dip of somewhat more than 4 dB. Again, the elevation pattern is essentially  $\sin \theta$ . The loop-mode cancellation is 181 dB. The  $50\Omega$  input resistance occurred for a toroid diameter of 0.087573 wavelengths; again, the inductive reactance was  $4,000\Omega$ , very large. It is to be expected that the impedance will again be very high at the third resonance. However, at the higher resonances, the toroid diameter is no longer electrically very small.

The winding length is given approximately by

$$l \approx \pi D \sqrt{1 + [NT \cdot NS \sin(\pi / NS) / \pi(D/d)]^2}$$

where the toroid and turn diameters are  $D$  and  $d$ ,  $NT$  is the number of turns, and  $NS$  is the number of segments per turn. For case 1 with  $NT = 20$ , the wire lengths at the two resonances are 0.321 and 0.641; for case 2 with  $NT = 10$ , they are 0.641 and 1.261.

## Conclusions

The resonant CWTHA exhibits a very high  $Q$  at the first two resonances, and as expected, a very narrow bandwidth at both. Azimuthal dips occur with depths depending on the ratio of toroid to turn diameter and the number of turns. For the two cases calculated, the dips at first resonance range from

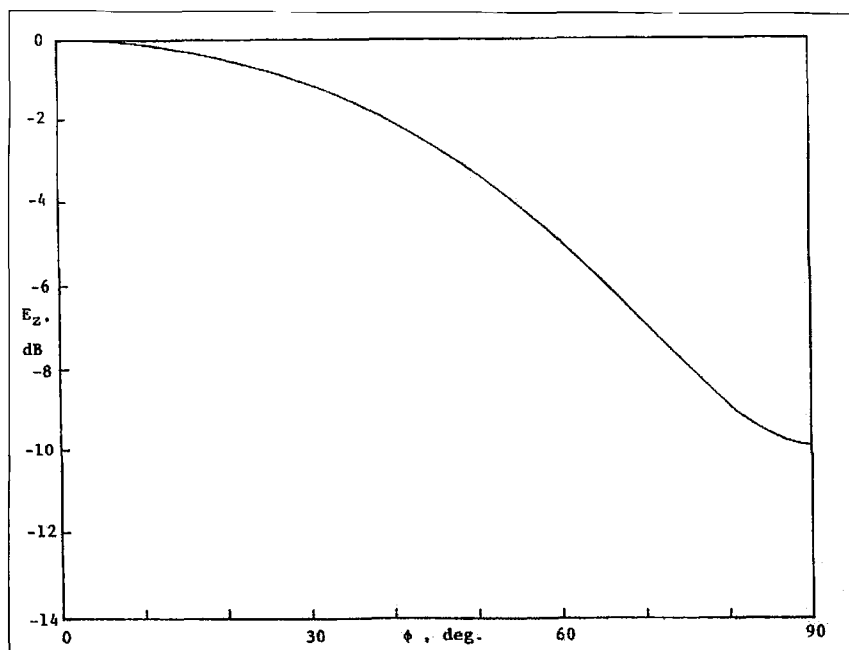


Fig. 3. Azimuth pattern for 20-turn CWTHA.

Continued on page 59



# MFJ's 1899T Portable Antenna

*Great for the Yaesu FT-817 or any other QRP rig ...*

*Over a year ago, I purchased a new Yaesu FT-817 Backpacker transceiver. This small "do all" and "go everywhere" portable is a real delight to operate. I was enjoying experimenting with all the modes of operation right from my home QTH, using the station's big antennas.*

While trying to think up something else to do with this marvel of HF/VHF/UHF packaging. I realized that I had not attempted portable/battery operation. But why not?

The transceiver is designed for portable use — just add batteries and go! No, hold on a minute, I realized that it needs an antenna of some kind, something portable, small, lightweight, and something that'll work. The proverbial "wet noodle" is small and lightweight but even when used with the best antenna tuners, it just doesn't work.

I began to read magazine articles, check into QRP chat groups, and make a lot of general antenna inquiries. I found that just about everything has been used as a portable HF antenna with varying degrees of success. I learned quickly that with QRP, one man's failure can be another man's success.

Because of small capture area, short ended whips normally just can't perform to the level necessary to maintain the QRP fun!! For me, this was verified when I purchased several mono-band HF whip antennas. I could hear the strong stations all right, but I almost went hoarse trying to get just one of them to answer me.

Before giving up on the idea of HF portable in the hopes that any QSO I'd get would be more than just pure luck. I wanted to try one more antenna, the MFJ-1899T all-band vertical. I had heard that Martin Jue (president/founder of MFJ) had become an ardent fan of QRP and was offering several new QRP accessories, including an 80- to 2-meter portable antenna for the Yaesu (or any QRP portable) FT-817.

## Arrival

I was at work when UPS delivered an 18"-long box. You're kidding, right? An 80- through 2-meter antenna inside this box? No way. This is not what I had expected. Opening the box revealed a two-piece antenna, one a telescoping section and the other a rod covered in black heat shrink with a series of brass holes, a small jumper wire referred to as the wonder lead, and a page and a half of printed information.

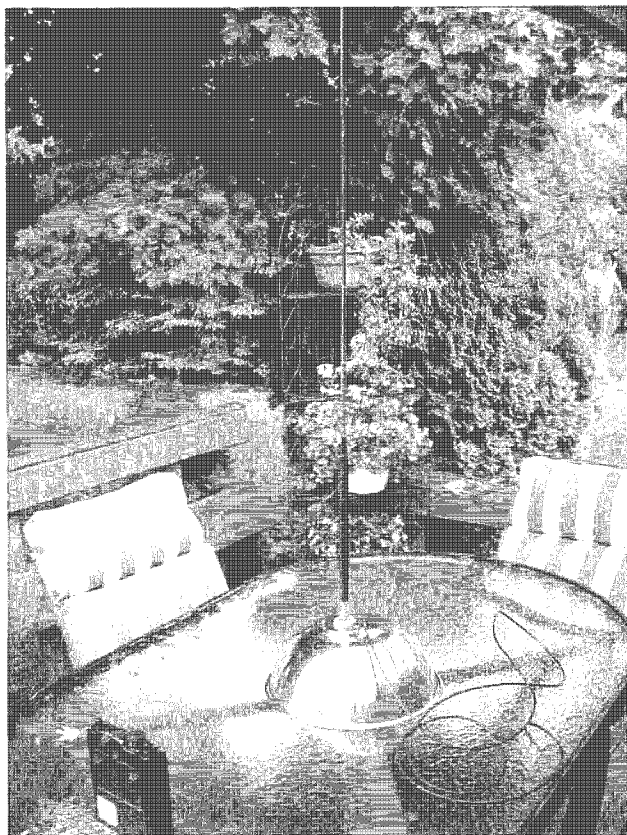
Assembly requires no instruction. Intuitively, you screw the telescoping section into the black base assembly — assembly done! The initial appearance of the MFJ-1899T resembles a dwarfed version of the popular outbacker mobile antenna. The half

page of instruction illustrates which tap to use for which band of operation. Additionally, you are advised to adjust the telescoping section to obtain the best SWR match. More on the antenna documentation later.

The MFJ-1899T is composed of two sections and when connected measures 19 inches. By the way, 19 inches is roughly a quarter wavelength for 2 meters. Fully extended, it measures 64 inches. The larger base section has a 1/2-inch section of threaded brass that screws into the telescoping section. A good tight fit was evident between both major sections as well as between each section of the telescoping whip. It is very important that good, tight, metal-to-metal contact be made if this kind of antenna is going to perform for any length of time. The small sheet of instruction identified six individual taps corresponding to the various ham bands. Carefully feeling around, I discovered that there was a seventh tap adjacent to the sixth one, and it was still under the protective heat shrink.

A small pocketknife opened the heat shrink sufficiently for me to insert the wonder lead plug. If I were a betting man, I'd guess that this tab works best at 4 meters (a band not available to





*Photo A. Test setup with steel bowl.*

U.S. hams). Somewhere within the combination of the telescoping section and the base loading coil tap you'll find a resonance for 80- through 2-meter operation.

The feedpoint of this antenna uses a BNC-type connector. At first, I was concerned about the free play within the BNC connector, but I soon discovered that it was spring-loaded. I am not

the antenna, away from body capacitance and any possible damage to the radio.

### **Playing with it**

So how does it work? Does it work at all? After attaching the antenna to my FT-817 and selecting the various taps, I "surfed" the ham bands from 80 meters all the way up to 2 meters by

real sure what advantage free play at this point might have. I did notice one thing that made me extremely uncomfortable, and this was the loading that this antenna has on the FT-817 front panel mating connector. When the antenna is fully extended, the FT-817 becomes very unstable and prone to falling over! After initial trials with the front connector, I was fearful that damage would be done to the FT-817 connector. Instead, I use a mobile mag mount attached to an inverted metal

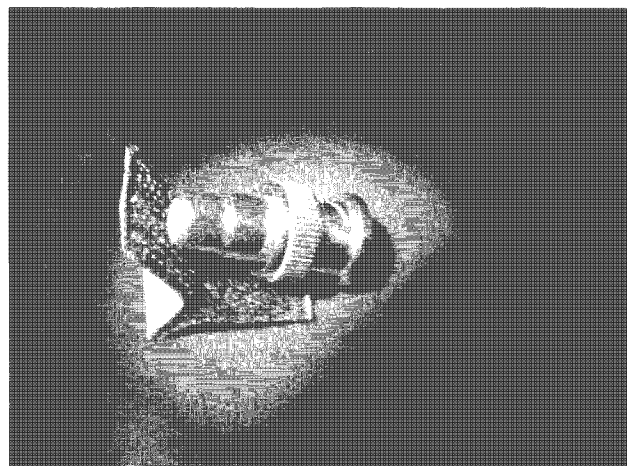
only having to change the antenna tap. Reception of HF stations, including shortwave broadcast, was very good. However, all QRP operators are aware that receiving is one thing, but can it get out? Believe me, this little antenna can!

Transmitting performance of the MFJ-1899T was excellent. I was able to get within 2.5 to 1 SWR on all bands without a tuner. Using a tuner allowed me to get a flat reflected wave regardless of the band. As a way of gauging its performance, I ran a series of very unscientific tests comparing it to a couple of monoband whip antennas and a random 175-foot endfed wire. Using a small QRP antenna tuner and some random fashioned counterpoise, I was able to get a near-perfect SWR null on all bands. Using the counterpoise seemed to improve the signal-to-noise ratio on receive, and aided in helping DX stations copy me a little better.

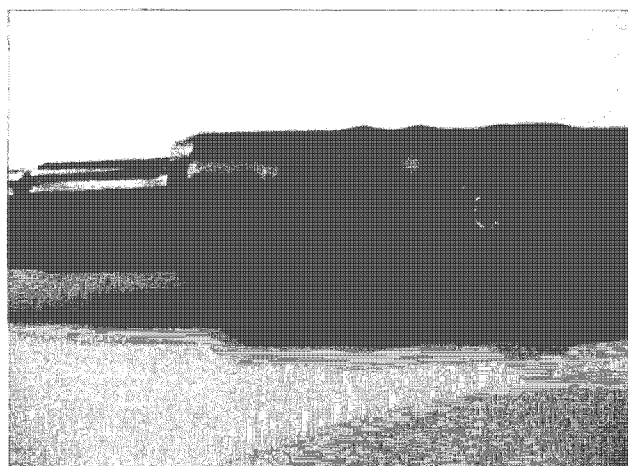
I am sure a better setup would be to make or purchase a tuned set of counterpoise wires. Make no mistake, the remaining half of the quarter wave waveform is necessary, no matter how you get it. The counterpoise is very important to the operation of this type of antenna. Many hams write off vertical whip-type antennas because of poor performance, when more often than not all they need to do was add a counterpoise.

### **Unscientific testing**

The MFJ scored excellent in the QSY department — changing bands



*Photo B. Connector.*



*Photo C. The seventh tap.*



was fast and easy. Once on the air, general reception was about the same regardless of which antenna I used. I said "about" — remember, this is not scientific.

Sometimes the wire would bring a station as much as an S-unit or two higher than either of the whips. This might have been because of cross-polarization difference or any gain as a result of the other station being in the wire's major lobe.

The differences between all the test antennas became more apparent when I found out that stations could hear me with the MFJ antenna but not the other whips. When I switched between the monoband whips, I received very poor reports — often "cannot copy" reports. Depending on the contacted stations' geographical location as compared to major lobe of the random wire antenna, they may or may not hear me. If the station I was in QSO with was in the broad side of the wire, the MFJ-1899T could not perform as well.

Although this was a very uncontrolled series of tests, I find that this is exactly what most hams do. For me, it illustrated that I could use this antenna for portable use and make contacts.

By the way, did I mention that from Connecticut/Massachusetts border. I was able to work throughout Europe, many midwestern U.S. states, several Caribbean islands, and my biggest DX, Israel, all with the FT-817 and the MFJ 1899T!! And this was with less than 5 watts on 20- and 17-meter SSB, not from a mountaintop, nor on some perfect ground plane body of water, but from my backyard, 100 feet above sea level.

As far as the lower HF band performance goes, a couple of times I managed to check into the horse traders net on 3898, where the net control station is located about 800 miles south of me. That's 80 meters in case you missed it. This is not a 132-foot 80-meter dipole, nor does it pretend to be. But it does allow you to make some contacts on 80 meters under restricted conditions.

One of my favorite methods of testing an antenna is to pick an HF band that offers ground wave propagation. Ten meters late at night usually is

dead, allowing just the locals to communicate with each other. The nice thing about ground wave is that it eliminates any effect skip can have on the raw capability of an antenna to launch a signal. The MFJ-1899T again outperformed the monobander whips, the difference in performance being that stations were able to copy me with the MFJ antenna when they couldn't otherwise. Most of the time, I received reports that I was not giving any S-meter reading but was FB copy! Most 10-meter ground wave stations were 10 to 15 miles from my QTH.

### Some things could be improved

In spite of all the excitement generated by the MFJ all-band portable antenna, there are some issues that need to be addressed by MFJ.

The documentation can only be judged as poor. This is not the standard documentation that MFJ has provided with all their other products. The one and a half sheets of poorly reproduced instructions and information mostly discusses the need to use a counterpoise with the antenna for maximum efficiency. The half-sheet piece of documentation (barely readable copy of a copy) provides estimated lengths for the telescoping whip as required for each band of operation.

No mention of the famous MFJ guarantee — in fact, the MFJ logo is obviously missing. Because of the British spelling of certain words in the text, you soon realize that MFJ is privately labeling the MFJ-1899T. In the U.K., this antenna is sold as the ATX by Waters and Stanton Company and in Germany by WiMo Antennen und Elektronik GmbH. A quick call to Waters and Stanton confirmed that MFJ was their U.S. distributor. A clear and much better copy of the documentation is available at Waters and Stanton Web site, [http://www.wsplc.com/leaflets.html].

A quick check of the ATX antenna as sold by Waters and Stanton reveals that their version of the MFJ-1899T ATX is available configured with PL-259 or a 3/8-inch threaded fitting as

Continued on page 59

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# Snakebit!

*A radio tale about the importance of getting things right the first time.*

*The rhythmic staccato of the code sender seemed like a stream of bean shooter beans bouncing against Charlie's brain. Why, oh why, had he gotten roped into the business of learning ham radio?*

He was sure he would never fully know. Lots of study, lots of frustration with the code, working the late hours as a bag-boy to pay for the little handie-talkie, and now sweating out General Class. Maybe he should have stayed at Tech. And he would have, were it not for his "Elmer."

Charlie's "Elmer," Don Wilke, was an old-school ham. Code was his thing, and he constantly lamented its demise, worrying that one of the final communicative arts would breathe its last in the very near future. Charlie would have just been content to sit with his Tech ticket. But not Don. And little did either know that this bit of gentle persuasion coupled with hours of practice, would reach their culmination in one brief test of radio skill.

The "dahs" and "dits" kept coming. Charlie sat there, sometimes as much as two to three letters behind, jotting down the words of the canned QSO. Here a number, there another number. Temperature. Street address. Wants a card. 73, and it was over.

"Well, how did you do?" inquired Don. Charlie wasn't all that confident, but he knew he had to face his "Elmer"

sooner or later. He had not been all that crazy about Don driving him over to the exam, but since he couldn't drive and his folks were busy and it was too far to bike, there was little choice. So now, the inevitable question faced him: "How did you do?"

"Don't know," grunted Charlie. "I suppose I got enough to pass. If not, there is always next time."

"This time there's a next time," returned Don. "How about if you are in a position where you only get one chance? Maybe that particular transmission won't come the second time. You'd better get it right the first time or face the consequences!"

Charlie didn't like it when Don lectured. He knew Don was right. He knew his father and mother were right. The advice was good and sound, but not welcome.

"Yeah, you're right," mumbled Charlie. "I probably missed a few, but I still think I passed. I did everything you said. Guess I'll have to work on technique some more."

Their conversation was cut short by the volunteer examiner's appearance in the waiting room.

"Charlie Phillips?" he called. "We need Charlie Phillips up here now!"

"Oh, great," thought Charlie. "Not only didn't I pass, but now this idiot is going to publicly humiliate me in front of the whole room. There must be at least 45 people here. And several friends from school. And I'll be the only one who didn't pass. What a rip."

Charlie's thoughts were cut off by the VE's broad smile and handshake.

"Congratulations, Sport," beamed the VE. "Your copy was five-by. Come on over here and let's see how you can send."

The rest of the escadrille was a piece of cake. Charlie had a good, natural fist, much to Don's delight. It wasn't long before a brand-spanking-new General Class ham radio operator left the examination hall.

"Well, let me be the first to congratulate you, Charlie," offered Don. "You've just opened up a lot of frequencies and opportunities. I bet your Dad will kick in the difference of what you need for the HT. He really wanted to be here, but duty called. Bet all you have to do is ask," Don continued with a sly grin.

"So you two have been plotting this thing all along and together, haven't you?" demanded Charlie. He should have known that his Dad was in on



this. Dad had a good job but worked pretty hard at it. Charlie's initial interest in becoming a ham had come from his father. And now that interest was about to pay dividends.

"You might say that," replied Don. "We kind of worked it out together. I believe that if the lawn is cut and trimmed by the time he gets home tonight, it's in the bag!"

The drive home was marvelous. Don let Charlie work every repeater in town. He even let him work K8JHB, the exclusive closed private repeater that had all the bells and whistles on it, even being able to tell if someone had left you a message. It was said that only old or rich people could become members of K8JHB. Don was a member. Charlie called his mother through the patch to tell her the good news. It was a great day.

It had been a great day and was about to get better. Charlie cut grass and trimmed the entire lawn during the course of the rest of the afternoon. He had just finished and was noting the time. Five p.m. They were really working his Dad a bit hard today. Usually he got off by 2 p.m. on Saturdays. It was now past five. He was just starting to think about being concerned when a familiar rumble reached his ears. Sure enough, Dad was pulling in with old Growler, their jeep. Growler was a project unto itself, and something Charlie couldn't wait to drive in a year or two. His time would come. He knew Dad would never get rid of Growler. It was too much fun to have around. His father ripped off the seat belt and jumped out of the jeep.

"How did you do on the test?" he demanded.

"I aced that sucker!" exclaimed Charlie. "Piece of cake."

"Roger on the cake!" his father shot back. "I got some stuff for you to carry in. Come on out and help."

Charlie hadn't noticed any boxes in the jeep. It was only when he came close that he saw the all-too-familiar plastic bags from "Signal Sam's Ham Radio Store."

"What's in the bag?" he questioned. But the grin on his father's face gave it all away. "Oh, yowee! You didn't, did you?"

"Sure, why not? I had promised you, hadn't I?" asked his Dad. "Don called me on the land line as soon as he got home. That's why I was a bit late. Wanted to have it all ready for you when I got home. Consider it your birthday, Christmas, graduation, and wedding present for the next five years!"

With a hurried "thanks," Charlie drew the little HT out of its box, turned it on, and keyed up, without bothering to listen. The little instrument responded by emitting the CW call of the local repeater. His call sign in label tape was already on top of the rig. Things were just going too well. His euphoria was brought sharply back to earth by a stern rebuke from his father.

"You ever key up like that again without listening first and then not IDing and you won't have this thing very long!" his dad instructed. "You know much better than that. The operating procedures are clear. Now ID and apologize."

Charlie didn't like it when he screwed up. He didn't like it especially when he did so in front of his father. His dad was fair but very firm. He knew he would have to apologize to the whole world over the repeater, and he knew Don was listening. But there was no way out. So he did.

That evening was great. There were instructions to read, batteries to recharge, buddies to talk to. The worst part was sharing with his dad, brother, and sister. All were hams. The only one in the family who wasn't radio-active was Mom — and they forgave her for that because she was a very

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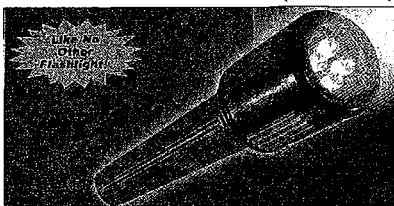
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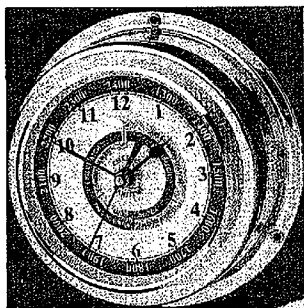
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understanding person and a marvelous cook. Charlie made contact after contact. It was after 11 p.m. when they finally quit, and that was only because everyone else in town had gone to bed and the repeater fell silent of its own accord.

inches. There was some local flooding but nothing bad. Sleeping was good and even in his excited state, Charlie finally fell asleep to the gentle drumming of the rain on the deck roof.

Sunday dawned clear and bright.

And anyway, about that time, it started to rain. One thunderstorm after another rolled through the area. Charlie checked it out on "The Weather Channel." They labeled it a Mesoscale Convective Complex or, simply, an MCC. Charlie had never heard of it.

The offending weather system put down a lot of rain during the night, on the order of three to four

inches. There was some local flooding but nothing bad. Sleeping was good and even in his excited state, Charlie finally fell asleep to the gentle drumming of the rain on the deck roof.

Sunday dawned clear and bright. Charlie was up early, out on the deck making contacts already at 7 a.m. He and two of his friends planned a bike ride on the newly opened Rimrock Trail, an abandoned railroad bed that had been converted into a bike path. He hadn't been on it yet and was anxious to see how far out of town the HT would work. So it would be a chance to get some exercise, have some fun with the guys, and do a little experimenting. It would also turn out to have plenty of excitement.

Breakfast was hurriedly eaten and

they were soon off to church. Dad made Charlie leave the HT at home. The last thing church needed was to have someone's HT go off in the middle of the sermon. There were plenty of mobile phones and beepers to do that anyway.

Charlie thought church would never end. But the last "Amen!" was finally said and the family went home. The usual quick Sunday lunch followed and, after filling his water bottle, Charlie set off to rendezvous with his friends at the bike trail.

"Hi, Charlie," called Bill and John. "Heard you finally got your handie-talkie. Can we see?"

Neither Bill nor John were yet radio-active, but this last little bit of persuasion was sure to win them over. Charlie let them both do a short transmission, which really impressed Bill. John was still not all that sure.

"Wouldn't a cell phone do the same thing?" he asked. "Plus, I don't need a license for it."

"You still have to pay," returned Charlie. "And you have to pay a lot if you go over the initial time limits that the phone company sets. This is kind of a one-shot deal."

"Yeah," agreed John, "but what happens when you can't hit the repeater?"

"Same thing that happens when you can't hit the cell!" returned Charlie. "You don't talk!"

"Aw, come on, you guys," pleaded Bill. "Let's get going and see how far that thing will reach."

None of them needed any more prodding. They set off down the bike trail, taking their time and checking into the repeater about every fifteen minutes. About an hour and a half out of town, they began having trouble hitting the repeater.

"Huh. About ten to twelve miles out. Not bad. Too bad I can't get into K8JHB. I bet it reaches all the way out here," thought Charlie.

They stopped to rest a bit. For the first time, Charlie noticed exactly how rural the area really was. There was only one small house in sight. No roads of any consequence, and because of the newness of the trail, no one on the trail either. And it was quiet.

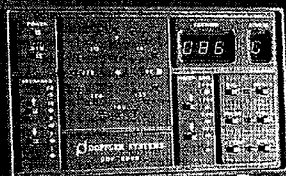
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Charlie hadn't noticed just how quiet things could get.

However, the peace was short-lived, being broken by a scream coming from the lone farmhouse a little over a quarter of a mile from the track. It froze all three of them for just a second. But upon hearing a second cry for help, they left the trail and headed for the house.

The scene that greeted them was scary. The young family, a husband, his wife, and two children, were huddled over a third child who lay very still in the yard.

"Damned old snake," raged the husband, as he kicked the now-dead copperhead again. "Don't know what he was doing crawling around here in the lawn. He won't bite anyone else, that's for sure."

"Oh, it doesn't make any difference," wailed the young mother. "Julie is going to die, I just know it."

"Why don't you telephone life-flight," ventured Charlie. "They can be out here in a matter of minutes. Since they know what kind of snake they are dealing with, they can come totally prepared, in maybe eight to ten minutes or so."

Charlie's speech was cut short by an oath and angry gesture from the father.

"Stupid telephone is out," he screamed. "Happens every time it rains. And in this day and age!"

"Well, how about using the cell phone," inquired Charlie. "You do have a cell phone, don't you?"

"Of course I do," snapped the young father. "But I have to just about be in town to make it work! I don't know why they can't put a cell pole out here further." The father's speech trailed off in sheer despair.

"Charlie," began John slowly. "Try the HT and see if it will reach."

For an instant, Charlie felt like an idiot. And even when he comprehended what John was suggesting, it took him a precious few seconds to swing into action. One by one he tried the repeaters. One by one, each returned him silence. He was too far out for the HT to reach. No one had a high enough antenna to go through. He had the same dilemma that the cell phones had.

"Charlie," ventured Bill. "You said there was one super-duper private repeater. Have you tried it? Surely they wouldn't mind if you used it in an emergency. Why don't you give it a try?"

Almost before Bill finished speaking, Charlie had the K8JHB frequency locked into the HT. He nervously listened for a few seconds before keying the transmitter. Would someone answer him? This was a pretty exclusive bunch. There was hardly ever any activity on it. Seemed as if the old and rich never really used it but just had it around like some ornament.

"This is WD8LLU. Can anyone read me?" Only silence followed.

Charlie re-keyed the HT.

"Come on, someone, please. This is WD8LLU with a medical emergency about 25 miles southwest of town on the new bike track. A small child was bitten by a copperhead. WE NEED HELP!"

What happened after that still amazes Charlie. It seemed like the whole town was listening on the frequency. A calm, mellow, yet authoritative voice answered his call.

"WD8LLU, this is K8CQL. Give approximate location and particulars. Please speak slowly and distinctly, your batteries are fading and you are starting to cut out."

Charlie did as he was instructed. Even as he spoke, the super repeater was transmitting his message via landline to the Mid-Continent Medical Center. Before he finished, a life-flight crew had the engines turning on their 'copter and were just about on the way. They had been briefed about the track and the possibilities of picking up patients along it. The crew had flown the route just days before.

"Yep, know the very place," muttered the pilot as he called for the take-off procedures and advanced collective. "Won't take long."

And it didn't, either. Within less than ten minutes of placing the call, the paramedics had little Julie and her entire family in the belly of the beast and were heading back to town.

"Woof," muttered Charlie. "Not even a thank-you."

"Jeepers!" exclaimed John. "What did you expect? How rational do you think you would be if your little girl got bit by a copperhead?"


"Probably not too rational at all," admitted Charlie. "Probably not too rational at all. I suppose that all there is left to do is to head on home. It's going to be a long fifteen miles."

The trip went surprisingly fast. After the initial letdown of the rescue, the second adrenaline rush soon hit and the excitement of being a part of a rescue sunk in. As soon as they entered town, it was obvious that things had turned out well. A TV station had picked up the story and was making the most of it. Before they knew it, a mobile crew had them all pinned down and were doing an interview. Charlie thought it would never end, but it finally did. And everyone went home, much to Charlie's delight.

A week later, the grass needed cutting again. Charlie had just finished the job when a tired, beat-up 4x4 pickup truck with K8JHB license plates pulled up in the driveway. A young, energetic man in his early 20s in blue jeans and tee-shirt swung out of the truck.

"Are you Charlie Phillips?" inquired a very mild, mellow, yet authoritative voice.

Speechless, Charlie nodded.

"Right," replied the man. "I am K8JHB. I would be honored to have you as a member of my repeater community. Here are the accessing codes. Use it all you like." 

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# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the June issue, we should receive it by March 31. Provide a clear, concise summary of the essential details about your Calendar Event.*

## MAR 2

**CAVE CITY, KY** The 26th annual Mammoth Cave ARC Hamfest will be held Sat., March 2nd, 7:30 a.m.-2 p.m. CST, at Cave City Convention Center (I-65, Exit 53). Admission \$6, tables \$7. Tailgating, ARRL forums, Bingo, 3.960 MHz meeting. VE exams at 9 a.m. Contact *Jim Erskine KD4GNN*, [mailto:chirotoons.com], or P.O. Box 187, Canmer KY 42722.

**KNOXVILLE, TN** On Saturday, March 2nd, the Shriners of Kerbel Amateur Radio Service will sponsor their annual hamfest at Kerbel Temple, 315 Mimosa Ave., Knoxville TN 37901, 8 a.m.-4 p.m. Admission is \$5. Indoor vendor tables are \$8 plus admission. Contact *Paul Baird K3PB*, 1500 Coulter Shoals Circle, Lenoir City TN 37772. Tel. 865-986-9562. Setup Friday 4 p.m.-8 p.m. and Saturday 5 a.m.-8 a.m. Overnight security will be provided. Talk-in on 144.83/145.43 or 146.52 simplex. Smoking indoors is permitted in designated area only.

## MAR 2, 3

**ANNANDALE, VA** Winterfest<sup>SM</sup>, Metro DC's first and best hamfest, will be held by the Vienna Wireless Society, Sunday, March 3rd, 8 a.m.-2 p.m. at Northern Virginia Community College campus, Annandale VA. VE exams Saturday, March 2nd at 9 a.m. All activities indoors. Directions: In northern Virginia, I-495 (Capital Beltway) to Exit 52A (Rte. 236/Little River Tpk. westbound). NVCC is 1 mile on the left. Admission \$6. Vendor tables \$20. For vendor info, contact *Terry Hines N4ZH*, 703-560-1824. Additional info can be found online at [http://winterfest.home.att.net/]. E-mail [winterfest@att.net].

## MAR 9

**SCOTTSDALE, AZ** The Scottsdale ARC, Inc., will host a hamfest March 9th, starting at 6 a.m., at Scottsdale Community College, 101 North - Exit Chaparral Rd., in Scottsdale. Parking \$2. Tables \$10. RV parking, self contained. VE exams. Refreshments. Talk-in on 147.18. Contact *Ed Nickerson WU7S*, 902 N. 73rd Place, Scottsdale AZ 85257. Phone 480-949-5162, E-mail [Bnickers@qwest.net].

## MAR 9, 16, 23, 28, AND SEP 24

**ST. LOUIS COUNTY, MO** Three all-day  
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training Severe Weather Observation seminars are planned at various locations around St. Louis County MO. At most locations SKYWARN Level 1 training will be presented in the morning, and classes resume in the afternoon with the SKYWARN Level 2 Program. Training will be held as follows: Saturday All-Day Classes: March 9th, March 16th and March 23rd. Evening classes (Level 1 only): March 28th and September 24th. For locations call the Severe Weather Information Line, 314-615-7857, for a taped message and additional information. There is no charge for the training. All are welcome including those from outside the area. Free parking. Certification provided for R.A.C.E.S. and SKYWARN, all at no cost. Attendance by members of the amateur radio community is encouraged, however, one need not be a ham operator to attend and participate in the program. Come and be a part of the largest SKYWARN program in the area, and monitor our SKYWARN nets during severe weather on 146.940 or 147.360 MHz.

## MAR 10

**AMHERST, MA** The Mount Tom ARA will sponsor the 17th Annual MTARA Flea Market at the Amherst/Pelham Regional Middle School, 170 Chestnut St., Amherst MA, on Sunday, March 10th. Doors will open at 7 a.m. for vendors and at 9 a.m. for bargain hunters. Admission is \$5 per person, children under 12 admitted free. Tables \$15 (reservation required), tailgating \$5. Amateur radio equipment, computers and parts, snack bar, no stairs, handicapped parking and help loading and unloading. 120 VAC available. Amateur and commercial VE exams given at 10 a.m. Contact *Dave WA1DC* for details about the exams by E-mailing to [wa1dc@pipeline.com], or *Steve N1SR* at 413-593-6554 for GROL, GMDS-O/M, ship radar, etc. exams. Talk-in on the 146.940(-) and the 145.130(+) PL 71.9 rptrs. For table reservations contact *Bob K1YO* at 413-569-0320 or [k1yo@arrl.net]; or *Cindy K1ISS* at 413-568-1175 or [n1fi@arrl.net]. Visit the Web site at [www.mtara.org] for more info and for driving directions.

## MAR 16, 17

**MARIETTA, GA** The 49th Annual Kennehooche ARC Hamfest and 1st Emergency Communications Expo will be held at Jim Miller Park (formerly Cobb County Center Park), in

Marietta. A map is available on the Club Web site at [http://qsl.asti.com/hootch/KARC-HamF.html]. This event is open Saturday 8 a.m.-5 p.m. and Sunday, 8 a.m.-3 p.m. Vendor setup Friday, March 15th, beginning at 1 p.m. Admission (good for both days) \$5 at the gate. Children under 12, supervised by an adult at all times, are admitted free. Along with all the usual hamfest trappings, a one-day (Saturday) Technician Class "Boot Camp" will be held on site. The onsite exam for "boot campers" will be held at 5 p.m. Saturday. All other VE Exams will be at 9 a.m. Saturday only. Bring a copy of your license, there is no copier on the premises. The Emergency Communications Expo will feature exhibits and static displays from local and state emergency teams, vendor booths, and informational seminars. Outside (under cover) bone yard and tailgating spaces are available. Talk-in on 146.880(-) PL 100 (KARC rptr.) from Friday, March 15th at 1 p.m., all day Saturday, March 16th; and until 2:30 p.m. on Sunday, March 17th. For more info contact *Mike Fisher KG4DPF*, 770-971-3610; or *Bob Butler W4RBB*, 770-579-9420, before 9 p.m. EST. You can send E-mail to [w4rbb@arrl.net]. Send written inquiries to KARC, P.O. Box 1245, Marietta GA 30060.

**MIDLAND, TX** The Midland ARC will hold their annual St. Patrick's Day Hamfest on Saturday, March 16th, from 8 a.m. to 5 p.m., and on Sunday March 17th from 8 a.m. to 2 p.m., at the Midland County Exhibit Building. Huge inside flea market with many dealers, large tailgate area, T-hunts, and a full service concession stand with hot meals, are some of the features. VE exams will be given at 1 p.m. on Saturday. Pre-registration is \$8, \$9 at the door. Tables for non-dealers are \$12 each for the first four, and \$20 for each additional table over four. For more info, contact the *Midland ARC*, P.O. Box 4401, Midland TX 79704; or contact *Larry Nix N5TQU* by E-mail at [oilman29@home.com]. You can view the hamfest flyer online and download a registration form at [http://www.w5qgg.org].

## MAR 17

**JEFFERSON, WI** The Tri-County ARC will sponsor a Hamfest Sunday, March 17th, 8 a.m.-2 p.m., at the Jefferson County Fairgrounds Activity Center, Highway 18 West, Jefferson WI. Vendors will be admitted at 7 a.m., all others at 8 a.m. only. Vendors only parking will be provided for unloading. Talk-in



on the 145.49 rpt. Admission \$4. Table space for 8 ft. tables @ \$6 each. For further info, contact *TCARC, 213 Frederick St., Fort Atkinson WI 53538*. Evening phone 920-563-6381, Fax 920-563-9551; or send E-mail to [tricityarc@globaldialog.com](mailto:tricityarc@globaldialog.com)].

**MAUMEE, OH** The Toledo Mobile Radio Assn. (TMRA), will hold its 47th Annual Hamfest/Computer Fair, 8 a.m.–2 p.m., at the Lucas County Rec. Center, 2901 Key St., Maumee OH. For details, send an SASE to *TMRA, P.O. Box 273, Toledo OH 43697-0273*. For voice mail call 419-535-6594. Web [[www.tmrahamradio.org](http://www.tmrahamradio.org)].

#### MAR 23

**BRAMPTON, ON, CANADA** The Brampton Fall Fairgrounds will be the location for "HAMEX 2002," co-sponsored by the Peel and Mississauga Amateur Radio Clubs. This event will feature amateur radio equipment manufacturers, major commercial vendors, new and used equipment and parts. VE exams, seminars, exhibits and demonstrations. Vendors are admitted at 7 a.m. The general public can enjoy this event from 9 a.m. to 1 p.m. Admission \$6; 6 ft. tables \$25; 8 ft. tables \$30., includes one free admission per table. Talk-in on VE3PRC at 146.880(-), and VE3MIS at 145.430(-). For more info contact *Jason Staines at 416-878-0576*; or *Lorne Jackson, 905-858-8594*. E-mail can be sent to [va3ngv@rac.ca](mailto:va3ngv@rac.ca) or [ve3cxt@rac.ca](mailto:ve3cxt@rac.ca). For online info, set your browser to [[www.peelarc.org](http://www.peelarc.org)].

**MICHIGAN CITY, IN** The annual Michigan City Hamfest will be held Saturday, March 23rd, at Michigan City High School, 8466 W. Paks Rd., Michigan City IN, from 8 a.m. until 1 p.m. CST. Early setup provided for vendors. Admission is \$5, children under 12 are admitted free with a paid adult. Table reservations and general info is available from *Ron Stahoviak N9TPC, 5802 N 400 W, Michigan City IN 46360*. Tel. 219-325-9089.

#### MAR 24

**MADISON, OH** The Lake County ARA, of Painesville OH, will hold its 24th annual Hamfest/Computerfest, 8 a.m.–2 p.m., at the Madison High School, 3100 Burns Rd., Madison OH. This event will feature new and used amateur radio, computer, and various other types of electronic equipment. The LCARA Hamfest will also feature craft demonstrations, and VE exams for those interested in earning an amateur radio license. Admission \$5, tickets may be purchased at the door. 6 ft. tables are \$8 each or \$15 for two. 8 ft. tables are \$10 each. For table reservations, call *Roxanne at 440-209-8953*.

#### MAR 30

**BRENHAM, TX** The Brenham ARC will hold its 4th annual Swap Meet on March 30th, rain

or shine, in an all-weather pavilion at Washington County Fairgrounds in Brenham TX, 8 a.m.–12 p.m. Free admission. Buy, sell, trade, new and pre-owned treasures "in the bluebonnets." No entry fee. Dealers welcome. Free covered tailgating spaces. Talk-in on 147.260(+ .600). RV hookups are available through the *Washington Co. Fairgrounds Assn.*, tel. 979-836-4112. Very large non-commercial tables are \$10 each. Commercial tables are free to commercial vendors. Please make checks payable to *Brenham Hamfest, P.O. Box 44, Brenham TX 77834-0044*. Early registration must be received by March 26th. More info is available at 979-836-9417 or the following E-mail addresses: [angdenis@academicplanet.com](mailto:angdenis@academicplanet.com), [briang@comwerx.net](mailto:briang@comwerx.net). Non-hams in your family might enjoy the Round Top Antique Show which is only a few miles away.

#### APR 13

**ST. PAUL, MN** The Robbinsdale ARC, Inc. (44 years old this year), will sponsor the 21st annual Midwinter Madness hobby electronics show at Ganglehoff Center on the Concordia University Campus in St. Paul MN, Saturday April 13th, 7:30 a.m. to 1 p.m. Concordia University is located off Interstate 94 near Hamline and Marshal. Super buys on computers, hardware, components, peripherals, and amateur radio equipment. Info, registration or tickets: 763-537-1722. Free parking. Same-day VE exams. Commercial Exhibitors. Large indoor swap meet. Admission is \$7 at the door. Children 12 and under admitted free. Advance discount tickets available at Amateur & Antique Radio Consignment Center, Pavek Museum, and Radio City. For more information visit [<http://www.visi.com/~k0ltc>], or E-mail [[k0ltc@visi.com](mailto:k0ltc@visi.com)].

#### APR 14

**STOUGHTON, WI** The Madison Area Repeater Assn. will sponsor the Madison Swapfest Sunday, April 14th, at Mandt Community Center, Stoughton Junior Fair Grounds on South Fourth St. in Stoughton. Doors open at 8 a.m. Talk-in on 147.15. For further info see the Web site at [<http://www.qsl.net/mara/>], or call 608-245-8890. Tickets are \$4 in advance and \$5 at the door. Free parking. Send payments to *Madison Area Repeater Assn., P.O. Box 8890, Madison WI 53708-8890*.

### SPECIAL EVENTS, ETC.

#### MAR 2

**ANCHORAGE, AK** The 30th running of the Iditarod® Sled Dog Race, also known as "the last great race on earth"®, will begin in Anchorage AK on Saturday, March 2nd. The race finishes 1,049 miles later in the Bering Sea Coast town of Nome AK. Throughout the race the Matanuska ARA KL7JFU, will be

sponsoring a Special Event Station. During the event the Iditarod's historical background, the connection hams have to the race, and current competitor standings will be discussed. Special event cards will be sent for verified contacts on the 160- to 6-meter bands. Event certificates will be available to amateurs who have made three or more different band QSOs. QSL to *Matanuska Amateur Radio Association, P.O. Box 873131, Wasilla AK 99687-3131*. SASEs are requested for both QSL and full size certificate submissions.

#### MAR 16

**MACON, GA** The Macon ARC will operate W4BKM 1500–2200 UTC on Saturday, March 16th, at the 20th annual Cherry Blossom Festival in Macon GA. Operations will be on Phone 14.240 and 21.335, and CW on 7.135 and 14.055. For a certificate, send QSL and a 9 x 12 SASE to *Macon ARC, P.O. Box 4862, Macon GA 31208*.

#### MAR 22–24

**OKLAHOMA QSO PARTY** The Oklahoma DX Assn. will sponsor the 2002 Oklahoma QSO Party (OKQP) March 22nd 2300 UTC–March 24th 2300 UTC. All entries may operate 36 of the 48 hour time frame. Stations outside Oklahoma work as many Oklahoma stations in as many Oklahoma counties as possible. Stations in Oklahoma work anyone. For complete details go to [[www.qsl.net/OKDXA](http://www.qsl.net/OKDXA)]. Entries must be submitted no later than April 30th. Logs should be submitted by E-mail to [w5atv@cox.net](mailto:w5atv@cox.net). Electronic logs should be named with your call (e.g., W5ATV.LOG). ADIF or CABRILLO formatted files are preferred. Paper logs of 100 QSOs or less may be submitted via postal mail to: *OKDX Assoc., c/o David Ratliff W5ATV, 3215 W 40th, Tulsa OK 74107*.

#### APR 13, 14

**GODALMING, SURREY, UNITED KINGDOM** A worldwide radio link-up will be on the air Saturday April 13th and Sunday April 14th, the 90th anniversary of the sinking of the *Titanic*. The link-up is being organized by the Titanic Wireless Commemorative Group in co-operation with Godalming Museum, to honor the memory of Jack Phillips, Chief Wireless Telegraphist aboard the *Titanic*. Jack Phillips was 25 years old when he stayed at his post on the *Titanic*, sending out SOS distress signals in Morse code to alert other ships. He saved over 700 lives before he went down with the ship 2 hours and 40 minutes after it struck the iceberg. It was the first time that the SOS message had been sent at sea. The special event commemorative station GB9ØMGY will be active on CW-only on all amateur short wave bands from 80 to 10 meters (including WARC bands), from 1000 hours GMT Saturday, April 13th, to 0219 hours Monday, April 15th (the precise time when the *Titanic* sank). 73



## Winter Potpourri

*Winter is here for activity via AMSAT OSCAR-40. Late in 2001, ground control stations began cutting back operating time for AO-40 users as the satellite's orientation was changed to keep the solar panels illuminated.*

The most important rule for our AO-40 controllers (G3RUH, W4SM, ZL1AOX, and VK5AGR) is to keep the batteries charged. While AO-40 is oriented for maximum solar-panel illumination, the satellite's antennas may be aimed at the earth only for small portions of the orbit during the winter and early spring of 2002.

This situation will improve beginning in April, but in the meantime AO-40 enthusiasts must be patient, and exercise other hamsat-chasing options.

### While we wait

The first choice for those who have become accustomed to AO-40 as their primary satellite is to adjust their schedules for the diminished operating schedule. There may be times when the satellite's antennas are aimed at the earth and the batteries are sufficiently charged to allow user access. This may not happen every day, at convenient hours or even with signal levels that make for easy contacts.

Check on the current operating schedule.

It is available on the Internet via [<http://www.amsat.org>]. There is a link on the front page to the AMSAT-DL site and its mirror where the schedule is initially posted. News about the schedule from Stacey Mills W4SM can usually be found in the AMSAT News Service Bulletins. These are on the AMSAT Web site and also available to E-mail subscribers. You can get the latest information sent directly to your E-mail account. For details go to [<http://www.amsat.org/amsat/listserv/menu.html>].

### Make station improvements

When your favorite satellite is in the sky and available for

use on a daily basis, it's hard to say "stop" and take things apart to make improvements. With AO-40 effectively offline for months, now is the time to tune your system for optimum performance. If your receive system is one of the typical commercial surplus down converters with a grill-style semi-dish, a little reading can offer insight to receive system improvements. Check out *Mode S — The Book* by Ed Krome K9EK. It is available from AMSAT. You can call with a credit card at 301-589-6062 or find out more at the AMSAT Web site.

During the AMSAT Space Symposium in Georgia last October, Jerry Brown K5OE presented two papers, both dealing with antennas for use with the 2.4 GHz downlink from AO-40. The bottom line was simple — more antenna gain and a low-noise preamp. If you already have a good 2.4 GHz downconverter at the antenna, then just some simple modifications to the stock commercial semi-dish and feed assembly can yield at least three to four dB of additional gain. Jerry pointed out that the stock system is linearly polarized while the satellite signal is circular.

Changing the feed to a short helix and screening the grill with hardware cloth or screen can make that small semi-dish "look" a lot larger. There is a 3 dB loss when receiving a circularly polarized signal with a linearly polarized feed like a dipole. Screening the dish will not only make it work with a helix feed, but it will also improve dish efficiency at 2.4 GHz. Check out Jerry's plans and information on the Web at: [<http://members.aol.com/k5oe/>]. You can also read his presentations in the *Proceedings of the AMSAT-NA 19th Space Symposium and AMSAT-NA Annual Meeting* available from AMSAT or the American Radio Relay League.

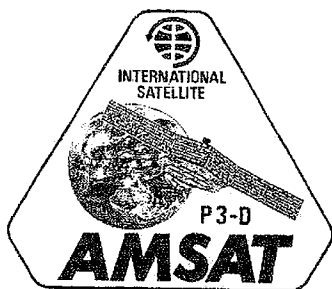
## Mode S

- The Book -

### 2001 AO-40/P3D Update

The complete guide to operating  
Satellite S-Band

by Ed Krome K9EK (ex-KA9LNV)



**Photo A.** Mode S — The Book by Ed Krome K9EK was updated and revised in 2001. It is available from AMSAT.



A good preamplifier can be home-brewed for 2.4 GHz, but if working with micro-miniature components is not for you, then consider purchasing a unit. There are a number of commercial surplus preamps available, but there are also some very good units made specifically for amateur operation. Although expensive, the DB6NT 2.4 GHz preamp is one of the best. In the U.S. it is sold exclusively by SSB Electronics [<http://www.ssbusa.com>].

An alternative to a new preamp is to get a better downconverter. Bob Seydler K5GNA sells TranSystem 3733 downconverters with excellent front-end noise figures that are ready to go for AO-40's downlink frequency band. You can contact Bob via E-mail at [[k5gna@aol.com](mailto:k5gna@aol.com)], or just look for his auctions on eBay [<http://www.ebay.com>].

When was the last time you checked the efficiency of your 70cm uplink? Now is a good time. Is the coax old? Is the antenna in good condition? How's the SWR?

### Get on Mode "L"

Most of the active stations using AO-40 are on the 70cm uplink and have heard that the L-band uplink on 1269 MHz (23cm) requires a lot of power and antenna gain. To some extent this is true, but stations with modest power (10 watts) and relatively basic antennas like a linearly polarized 45-element loop yagi have been quite effective during those times when the satellite has a low squint angle relative to their location, i.e., the satellite's antennas are aimed at them. An additional advantage to using the L-band uplink instead of 70cm occurs when ground controllers turn off the 70cm receiver in order to send commands to the satellite on two meters. The L-band receiver stays on.

If you already have a system for the 23cm uplink, it too could use some tweaking for optimum performance. Just like a 70cm system, the coax, antenna and SWR should be checked. It may also be worthwhile to check out methods to uplink a circularly polarized signal with its 3 dB advantage over regular and loop yagis. If your antenna is small and the coax run is long, perhaps now is the best time to invest in an amplifier. A good place to start is [<http://www.downeastmicrowave.com>].

### Consider Mode "K"

Looking for a new challenge? Building and using a receive converter for the mode "K" transponder downlink on AO-40 is not a good newcomer project unless you are already a seasoned microwave engineer. It

would take a very fat wallet to buy a DB6NT system to receive the 24 GHz signals from space. The handful of stations around the world that are currently receiving mode "K" have been microwave enthusiasts for a long time. Their systems are built from multiple components all hooked together like plumbing. Even the DB6NT system is not a simple, single box. It's built from individual filters, oscillators, and waveguide.

Most hams who are currently pursuing this "K" quest are attempting to piece their systems together from commercial surplus and home-brew components. On the Web there are two excellent places to start your search: [<http://www.sunsunsun.net/ao40/>] and [<http://www.oh2aue.pp.fi/ja/lati.htm>].

### Get ready for Field Day

By the time AO-40 is back on-line after its long period of offpointing, Field Day will only be two months away. It is hoped that AO-40 will be available for Field Day this year, and if so, there will be a lot of groups scrambling to put together a reasonably portable station capable of S-band (13cm) reception and U-band (70cm) transmission. There is no guarantee that AMSAT OSCAR-10 will be working. Remember that it will be 19 years old when Field Day 2002 comes around!

Do some Field Day orbital predictions for AO-40 and begin piecing together your portable gear now. It never hurts to have some spares on hand should something go wrong with your home system when AO-40 is back. A complete tested S-band receive converter with dish in the garage might come in handy in addition to providing a ready-to-go AO-40 Field Day station.

### Don't forget the other hamsats

That's right! Don't mope around during AO-40's vacation and forget

that there are a lot of other analog and digital hamsats out there. The FM satellites AMRAD OSCAR-27 and UoSAT OSCAR-14 continue to be popular with the HT crowd. PCSat has had its periods of low solar illumination, but has also had many periods of full battery charge for APRS and packet experiments by both mobile and portable users. The Fuji and RS satellites continue to provide excellent SSB and CW communications while UoSAT OSCAR-22 has been the mainstay of 9600-baud digital enthusiasts. A new Russian/Australian hamsat named Kolibri may have already been hand launched from the International Space Station by now. Even with AO-40 out of sight for a while, there's still a lot going on. Check it out!

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**Photo B.** The Proceedings of the AMSAT-NA 19th Space Symposium and AMSAT-NA Annual Meeting is available from AMSAT and the ARRL.



# Inside the HW-7

*The HW-7 Heathkit transceiver is a three-band QRP CW transceiver with provisions for built-in VFO and crystal transmit. Band coverage is the CW portion of forty, twenty, and fifteen meters. The transceiver can be operated from the Heathkit accessory power supply model HWA-7, an equivalent low impedance power supply, or batteries. The experienced amateur, QRP man, and even Novice will all appreciate the dependability and versatility of this transceiver.*

Whether you use it for standby, camping, emergency operation, or as your primary rig, the transceiver will prove its worth. Band changing and tune-up are easily accomplished with push-button band selection and single-control tuning. The lightweight and compact transceiver has push-button crystal transmit provisions for the Novice or QRP roundtables. Main tuning is accomplished through a 6-to-1 vernier that is virtually backlash-free. A relative power meter, built-in sidetone, and carry-along size make the transceiver a pleasure to operate.

The HW-7 started the famous Heathkit QRP series. Of all the QRP transceivers made by Heath, very little is said about the HW-7. The HW-7 was Heath's first entry into the QRP fray.

Although the HW-7 did perform to specifications, the main fault in the rig centered on the receiver. Like its brother, the HW-8, the HW-7 uses a direct conversion receiver. And, there's nothing wrong with a direct conversion receiver, provided it is of a good design. Unfortunately, the HW-7's receiver is not that blessed.

### Receiver overview

The receiver in the HW-7 is unbelievably simple. A dual-gate MOSFET is both the front end and mixer. Signals from the antenna are dropped directly into the MOSFET via a brute-force tuned circuit.

The output of the VFO or crystal oscillator is also routed to the MOSFET. Here the two signals are mixed and the resultant audio is applied to a simple LC tuned circuit consisting of L14 and C5, C7 and C9. It is these components that provide the selectivity of the radio.

After the audio filtering, the audio signal is then routed directly to the audio amplifier. This amplifier boosts the signal up to headphone volume.

### The transmitter

The transmitter is just about as simple as the receiver. The same VFO or crystal oscillator is coupled to the doubler/tripler before the signal is sent to the transmitter driver.

From here, the signal is amplified up to about two watts by two RF transistors running in parallel. Low pass filters that are selected by the proper push-button filter the output of the transmitter.

All in all, the HW-7 is about as simple as you can make a transceiver. And it is this simplicity that hurts the HW-7. In fact, Heath could have not chosen a worse device than the 40673 dual-gate MOSFET used in the receiver mixer.

### HW-7 fixes

There is really nothing you can do to improve the receiver in the HW-7 short of tearing out the entire circuit and starting over. You can sometimes get better performance if you use a resonant antenna coupled to an antenna matching circuit. Between the two, the extra tuned circuits will help prevent unwanted signals from getting into that dual-gate MOSFET.

To reduce microphonics and hum pickup from the audio circuits, run the HW-7 from a battery supply.

This holds true for the HW-8 as well. The direct conversion receivers can suffer from the AC pickup from a line-operated supply.

### Modifications to the HW-7

Even though the receiver is such a poor performer, there are very little in the way of modifications that can fix it. Generally, the only way to improve the receiver in the HW-7 is to tear it out and start all over again.

If you want to try your hand at improving the HW-7's receiver, I would suggest you scrap the MOSFET and try using a doubly balanced mixer such as the SBA-1. You more than likely will need to add some impedance matching transformers between the mixer and the VFO/antenna input.

An additional stage of low-level audio amplification would do wonders as well. By using either a low-noise op-amp such as the LM301 or a pair of transistors, the additional gain would be a great improvement.

The only problem with incorporating any of these ideas? They are not a drop in fix. The majority of the receiver would have to be scrapped, and new circuit boards designed and installed. It's not a task for the weak at heart. So, for the majority of HW-7s out there, the receiver is exactly the way Heathkit designed it.

### Playing with the audio

Because the selectivity of the radio is generated inside the audio chain, and since the audio circuits are very simple, you could spend a rainy afternoon experimenting with the circuit.

As designed by Heathkit's engineers, the LC components are very simple. A 200  $\mu$ H coil and some capacitors do the work. Mouser Electronics handles a line of high

*Continued on page 59*



### The CSS Safetenna

*Choosing an antenna can be a tricky task. There are so many aspects to consider. Do you need a single antenna that can be used on many frequencies? Maybe you want one that is more limited in bandwidth but that does a specific job on one frequency. It's bad enough that the decision can be somewhat daunting, but put a group of hams together and you'll hear a variety of conflicting opinions as to what is best.*

From my perspective, the key question about antennas is what I expect the particular antenna to do. If I were getting serious about contesting and DX, a log periodic or stacked monobanders at a couple of hundred feet would be my deal. If I'm trying to maintain peace in the neighborhood, a dipole may be a better answer. When I was living in an apartment, a rail-mounted mobile antenna on the balcony was about the only choice I had. In each case, the key issue was how much functionality could I get with the constraints I had to face. Like the third law of thermodynamics—there's always a trade-off. Bigger is better, but there are costs, in terms of both finances and effort that come into play.

The ultimate trade-off situation is operating under emergency conditions. It is generally accepted that a bare handie-talkie with a rubber duck antenna is not going to make it when facing a major disaster. This was proven out, unfortunately, at the World Trade Center. Reports are that amateurs quickly realized that about 25 watts with a decent quarter wave magnetic mount antenna was necessary to maintain communications. Similarly, when a repeater was knocked out of commission, an order for firefighters to clear the building was not heard, increasing the casualty count. In an ideal situation it would be preferable to be able to work stations direct, but this is not always realistic. In any case, if the antenna provides some degree of gain, you may be able to reduce power and extend your on the air time when using emergency power.

What type of antenna would you expect to need in an emergency? If you are working mobile from your own vehicle, there is normally no problem. Often you will be

expected to operate from another vehicle such as a Red Cross or Salvation Army car or van. This may be quite beneficial since you really don't want to drive your own car through a debris field, but it will require moving radio and antenna. Here, the choice is easy—the highest-gain two-meter antenna on a magnetic mount. While having an antenna tuned for both two meters and 440 MHz is optimal, normally there is not a problem operating 440 MHz into a two-meter antenna.

If you are going to be operating from a static location, however, the choice becomes a little more difficult. Solid walls make great

RF attenuators, so ideally you would want the antenna outside or as close as possible. In a best-case scenario, buildings designated as shelters, hospitals, and public service agencies would have a permanently mounted antenna with a cable fed to the preferred ham radio operating position. Unfortunately, for every well-planned emergency location, there are many that are not so equipped.

I've tried a number of variations to make do under adverse conditions. I've used a magnetic mount stuck to the top of the mobile rig. I've attached a mag mount upside down above the drop ceiling



**Photo A.** Here's the long and the short of it. Safetennas come in both 25-inch and 60-inch sizes.



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attached to a heating duct. I've tried J-poles, dipoles mounted vertically, and everything else I could think of. I never did find quite what I was looking for. Now there is an antenna made for such

occasions that seems to fill the bill quite nicely. The Safetenna from Creative Services Software (CSS) is an interesting approach to provide an answer for these types of problems.



**Photo B.** Even right out in the open, the Safetenna in my office doesn't seem too intrusive and provides good coverage for all the local repeaters.

Designed by Mike Thigpen AB4MT, the Safetenna was intended to provide better coverage under adverse conditions. Mike envisioned it as easy to keep in the trunk or under the seat of the car with string and coax so that it could be put into use when the handie-talkie and the cell phone just wouldn't do the trick.

The Safetenna comes in two models. The compact is 25 inches long and is intended for two-meter use. The full-size antenna is 60 inches long and can be used on both two meters and 440 MHz. Both units are constructed within a PVC pipe to keep the units protected and dry. At one end is a loop that can be used to hang the antenna. At the other is an SO-239 connector.

The larger Safetenna appears to have about 3-dB gain as compared to a quarter wave vertical. I conducted my own tests (with extremely limited and crude methods) to see how the Safetennas performed as compared to a rubber duck. At lowest power I measured the field strength with each antenna. I was able to get the same reading by adjusting the distance.

The rubber duck reading was at four inches, the compact Safetenna gave the same reading at 23 inches and the full-size Safetenna gave the same reading at 27 inches.

With recent events, I have the full-size Safetenna in my office hooked to my trusty old Icom 3200A. Working in a hospital, I may do double duty as both communicator and in support of the Radiology Department. I can hit all the repeaters I expect to need with this combination, so I know it meets my needs. A bent paper clip keeps it attached to the ceiling grid — now that's what I call easy to install.

These may not be the highest-gain antennas in the world, but for ease of use and durability, they belong in your grab-and-go kit. Both Safetennas retail for \$39.95 and can be ordered directly from CSS at Creative Services Software, 503 W. State St., Suite 4, Muscle Shoals AL 35661; tel. 256-381-6100; [http://www.cssincorp.com].

### January oops!

Everything about our January article on A&A Engineering's Smart Battery Tester was pretty smart, except for the dumb way in which we forgot to provide contact information: 2521 W. LaPalma #K, Anaheim CA 92801; tel. 714-952-2114; [www.a-aengineering.com]. Sorry about that, to all!



## Bumpiness

*Personal satisfaction aside, those of us who have discovered the joy of getting our computers and rigs to talk to each other have a responsibility to assist one another over the bumps. Fortunately, we have quite a number of hams assisting us as they write the programs they so willingly share.*

You may recall my dilemma with the Millennium Edition (Me) operating system. I have threatened, almost daily, to change to the XP system, but have put it off until I can be reasonably sure the computer will not lose even more compatibility with ham programs. So, this month, I am experimenting with different software to see what really works.

Believe it or not, some old standby favorites of the ham community are working on this machine better than they did using Win95 in the slower CPU. Sometimes there is just plain trickery afoot that does not explain well.

I mentioned a few months ago that the old tried-and-true Word 6 which was written for Windows 3.1 was working but having hiccups. Problems included no Spell Check, and then I noticed the Help file would not activate either. More dilemma.

It was finally decided to leave Microsoft's Word programs in the ditch they dug for them and install a copy of WordPerfect 8 I had available. Best idea in ages! Everything works, does not require an Internet browser to be in place, plus many of the shortcut keys are the same as what I was used to. Microsoft simply shot itself in the foot on that one. I am converted.

While searching for reminders of possibly forgotten software I visited the G3VFP Web page (see the lower lines of The Chart for new listing). There are always things to learn as these busy programmers and engineers keep producing new goodies for us. I recommend a trip there for anyone looking for ideas.

Dave has assembled a digital ham resource as nearly complete as it gets. He has grouped hardware and software by categories. Software includes DOS and Windows

utilities, logging, rig control, soundcard programs for CW, PSK31, Hellschreiber, MT63, Throb, SSTV, Wefax, plus software for the Linux and Mac operating systems. I think the only questions left unanswered are those with no answers or for questions that have not been asked.

Speaking of listings, I received a note from Bob WA2HNG, concerning some inactive listings in The Chart. I tried them and, sure enough, they needed modifying or removal. What you see today is a few months after the fact, but the Chart on the Web (see Table 1) was updated in December.

One of the reasons I mention these things is I notice hams on the air referring to the "info in 73 mag" and, of course, hams contact me directly to ask about discrepancies. There are times when sites don't respond but they are still there for such reasons as a server is down, or a site is moved to another server and the notice expires.

Often, the answer is simple. Sometimes it takes a bit of legwork, but the ham community seems to appreciate a printed listing such as this and I am glad it is useful — also that 73 continues to make it possible. Once in a while, I get a note from a ham that an URL does not work and I find he has simply missed inserting a character.

That is so easy to do and I really understand. The advantage I have here is that I can copy and paste these addresses from my word processor file directly into the browser and that works. That is hard to do from a magazine listing.

Back to ham stuff. As I mentioned previously, using Win95, I had problems with a few of the old standby PSK programs so many hams were using successfully. So I have been experimenting with some of this

software in the Me operating system. This is a good test and enlightening to me.

I installed Moe Wheatley's WinPSK, ran the setup (where crashes used to occur), got it on the air and made my way through a QSO, building macros as I went. Worked like a dream. Chalk up one for an old program that fit the Me profile just fine.

### Instant success s-o-o-o easy

Then, I tried a variation of the original in the WinPSKse format from Dave KA1DT, and it not only worked, but the first or second station identified on the monitor was in South Africa. I did a quick audio drive check, altered a few macros, gave him a call, and Bingo! I worked the first PSK signal I recall from that part of the world.

I call that an easy setup. Install, tweak, and work instant DX! What a way to live. Sparks the enthusiasm. I guess I really should not give all the credit to the program. Being in the right place at the right time has a lot to do with such a phenomenon, but it was a good result for what could have been a hum-drum experiment.

The WinPSKse freeware in the screenshot image is a remarkable offering. The author did a bang-up job revamping the original WinPSK package, including a mini-log that can be imported directly to a logging program, and added a second receive pane so two signals can be monitored simultaneously.

I spent a little more time with the WinPSKse and became fascinated with all that is built into it. At first glance, I felt it was pretty barebones but it is well thought out for ease of use and some special applications.

The Help file is, simply stated, excellent. Just about every question I had could be answered simply and quickly with a trip



through Help. In there, you will find instructions for cable connections to interface your rig to the computer soundcard as well as a schematic for a PTT circuit for the serial port, plus just about anything you need to successfully operate this program.

One thing I did not find readily in Help was where to find capability for more than one set of ten macros. Clicking the arrows directly under the defined function keys on

the monitor revealed three more sets of ten, making a total of forty macros available for definition, much more than I ever use.

In the General Setup under the Settings pull-down I found a Rig Control tab. Clicking that brought up the possibility of controlling the Small Wonders Lab PSK 20/40 rigs directly from the software. That is the only rig control scheme available at this Version 2.23 offering, but more are promised at a later date.

You have the choice of clicking on the macro buttons on the screen to activate them, but I really appreciate the Function Key option. I especially like the buttons labeled with the F-Key ID, the macro title and, if you wish to be sure what you are about to send, you can rest the cursor on the button and the tool-tip, if activated in the setup, will display the contents of the macro. Of course, it is still not foolproof, which I managed to prove, but that was my own clodlike approach which I will not discuss here.

There is one error (oversight) I will admit to. It came during preparation for taking the "perfect screenshot." I realized as I looked at the background colors in the transmit and receive panes that they would present a distracting combination when printed in the gray scale in the magazine. The backgrounds were very dark and the text was light.

You will find there is a pretty fair selection of colors for help in this area. Also, you can select different fonts as available from your other program installations. So I thought this was a natural and tried black text on white background and ran into trouble immediately. I retraced my steps and changed one of the receive panes so I could observe what was happening.

If you insist on using black text, you will discover you are not able to find the crosshair cursor in the waterfall because there is no way to change the background color in the waterfall and the crosshair matches the received text color. Black on black doesn't compute to the eye.

So the color combo I chose is an imperfect compromise at best, but helps make a decent screenshot. If I were not snapping a picture of it I would have left it alone. (See the text under the screenshot.)

## Zoom isn't just about speed

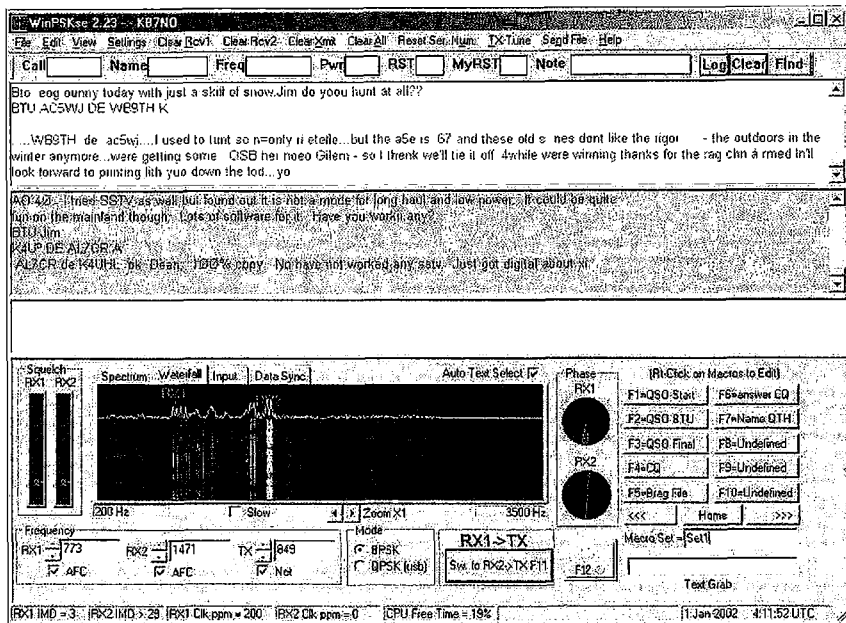
Now for the error. I paid so much attention to the colors that I overlooked a really good feature in the waterfall. The width is adjustable with the Zoom control located just below the waterfall. If you study the numbers at the left and right of the waterfall display you can calculate there is 3,200 Hz displayed, which makes the traces just a tad cramped.

One click on the zoom spreads this display out to just 1,600 Hz. More choices are available, but just the one step makes it much easier to select the trace you want to copy. I have to say this about WinPSKse. It was virtually no problem to select a trace and have it "lock" on the

Source for:	Web address (URL):
Mix W2 Soundcard program for PSK31, RTTY, new modes, MTTY, FSK31, more	<a href="http://tav.kiev.ua/~nick/mixw2/">http://tav.kiev.ua/~nick/mixw2/</a> <a href="http://www.nvbb.net/~jaffejm/mixwpage.htm">www.nvbb.net/~jaffejm/mixwpage.htm</a>
FREE MMHam site — MMTTY — MMSSTV	<a href="http://www.qsl.net/mmhamsoft/">www.qsl.net/mmhamsoft/</a>
FREE VK7AAB — SSTV-PAL — PSK-PAL	<a href="http://users.origin.net.au/~crad/">http://users.origin.net.au/~crad/</a>
Much ham info w/SSTV downloads	<a href="http://www.conknet.com/~kb1hj/index.htm">www.conknet.com/~kb1hj/index.htm</a>
TrueTTY — Sound card RTTY w/ PSK31	<a href="http://www.dxssoft.com/mittty.htm">www.dxssoft.com/mittty.htm</a>
Pasokon SSTV programs & hardware	<a href="http://www.ultranet.com/~sstv/lite.html">www.ultranet.com/~sstv/lite.html</a>
PSK31 — Free — and much PSK info	<a href="http://aintel.bi.edu.es/psk31.html">http://aintel.bi.edu.es/psk31.html</a>
Interface for digital - rigs to computers	<a href="http://www.westmountainradio.com/">www.westmountainradio.com/</a>
Soundcard interface info — includes Alinco	<a href="http://www.packetradio.com/psk31.htm">www.packetradio.com/psk31.htm</a>
Interface info for DIY digital hams	<a href="http://www.qsl.net/wm2u/interface.html">www.qsl.net/wm2u/interface.html</a>
WinWarbler info and DXLab Suite	<a href="http://www.qsl.net/winwarbler/">www.qsl.net/winwarbler/</a>
MFSK-related tech info — how it works	<a href="http://www.qsl.net/z1tbpu/">www.qsl.net/z1tbpu/</a>
Throb — lots of info	<a href="http://www.lsear.freemove.co.uk/">www.lsear.freemove.co.uk/</a>
Download Logger, also Zakanaka	<a href="http://www.qsl.net/kc4elc/">http://www.qsl.net/kc4elc/</a>
PSKGNR — Front end for PSK31	<a href="http://www.al-williams.com/wd5gnr/pskgnr.htm">www.al-williams.com/wd5gnr/pskgnr.htm</a>
DigiPan — PSK31 — easy to use	<a href="http://members.home.com/hteller/digipan/">http://members.home.com/hteller/digipan/</a>
TAPR — Lots of info	<a href="http://www.tapr.org">www.tapr.org</a>
TNC to radio wiring help	<a href="http://freeweb.pdq.net/medcalf/ztx/">http://freeweb.pdq.net/medcalf/ztx/</a>
ChromaPIX and ChromaSound DSP software	<a href="http://www.siliconpixels.com">www.siliconpixels.com</a>
Creative Services S/W Multimode w/PSK	<a href="http://www.cssincorp.com/products.htm">http://www.cssincorp.com/products.htm</a>
Timewave DSP & AEA (prev.) products	<a href="http://www.timewave.com">www.timewave.com</a>
Auto tuner and other kits	<a href="http://www.ldelectronics.com">www.ldelectronics.com</a>
RCKRtty Windows program with free DL	<a href="http://www.rckrtty.de/">http://www.rckrtty.de/</a>
SV2AGW free Win95 programs	<a href="http://www.raag.org/index1.htm">www.raag.org/index1.htm</a>
Source for BayPac BP-2M & APRS	<a href="http://www.tigertronics.com/">www.tigertronics.com/</a>
Int'l Visual Communications Assn. — nonprofit org. dedicated to SSTV	<a href="http://www.mindspring.com/~sstv/">www.mindspring.com/~sstv/</a>
Hellschreiber & MT63 & MFSK16 (Stream)	<a href="http://iz8bly.sysonline.it">http://iz8bly.sysonline.it</a>
HamScope — multimode w/ MFSK16	<a href="http://users.mesatop.com/~ghanserv/">http://users.mesatop.com/~ghanserv/</a>
YPLog shareware log — rig control — free demo	<a href="http://www.nucleus.com/~field/">www.nucleus.com/~field/</a>
WinLink 2000 System info	<a href="http://www.winlink.org/k4cjp/">www.winlink.org/k4cjp/</a>
Another GREAT Web resource	<a href="http://www.g3vfp.com/">www.g3vfp.com/</a>
Airmail — free program to use WinLink 2000	<a href="http://www.airmail2000.com/">www.airmail2000.com/</a>
WinPSKse — PSK31 freeware	<a href="http://www.winpskse.com/">www.winpskse.com/</a>
The Chart NOW ON THE WEB	<a href="http://www.geocities.com/normandy214/ham_radio.htm">www.geocities.com/normandy214/ham_radio.htm</a>

Table 1. The infamous chart.





**Fig. 1.** Screenshot WinPSKse is a popular freeware offering, and the more I worked with it the more I could understand users' loyalty. This software is a modified version of the original WinPSK by Moe Wheatley AE4JY. The added "se" denotes the special edition by Dave KA1DT, who created a very user-friendly ham program. Two receive panes simultaneously display incoming signals. Left click your mouse button for RX1 and right click for RX2. The active panes are easily swapped by clicking either the mouse button below the waterfall or (easiest way) hit F11. F12 toggles xmit and rcv. The background color lightens in the active pane to reduce operator confusion. The macros, 40 available, are a snap to write and are well defined and easily activated with the function keys. Note the IMD readings at the bottom are simultaneously displayed for both incoming signals. The mini-log will keep track of your activities and is saved in ADIF format. There is rig control available for the PSK20/40 rigs from Small Wonders Lab. Nice touch for the QRPer. Another feature, and one I didn't set properly for this shot (see text), is the zoom on the waterfall. This software has, in my opinion, about as much convenience built in as the casual digital newcomer will require and it will all fit on a floppy disk. Included is a great Help file. A very thorough offering, and simple to set up and get going.

## THE DIGITAL PORT

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signal, first try, every time with the signals all scrunched up as they were in the screenshot. Probably why I didn't think to click the zoom.

The mini-log saves in ADIF format. I took a look at the automatic file it created and it looked correct, at least at first glance. I attempted an import into Logger and it recognized the file was there, but did not import the info. I have not dwelt on this, but it would be worth finding the reason if I were to continue using the program. However, you can find properly saved, previous contacts and display them directly from the WinPSKse log, which is what most logging is about.

I still amaze hams who have not gotten into the computerized logging when I tell them on the first exchange when we worked before. There are so many digital

logs available that work well, it is just a matter of picking one and getting used to it.

## A little editorializing ... and a project

It occurs to me there is an underlying reason why these various Windows operating systems react to ham software the way they do. It really is not the will of Microsoft to cause hardship on the ham community. The folks up in Washington state barely know we exist.

The real problem is most of the owners of these machines use them as toys. I mean to play music, games, visit chat rooms, and "cruise the Web." Somehow, other than writing a few letters occasionally, most users, different from you and I, seldom have a complaint that cannot be addressed with the purchase of a room-filling speaker system.

I am a little hard on those people, which is unfair. It is really an age-group thing now

that I think about it. I was making some blanket statement to a ham over the air concerning these things and he, being younger, reminded me of that fact by informing me he also used his computer for those other obscure purposes just mentioned.

One more thought on users and age groups is an observation of computer literacy. I was sitting in a room the other day with some folks old enough to have teenagers and perhaps a bit older who admitted they relied almost wholly on their kids to do the E-mail in the house. I have no idea what the parents with those computers use them for if left alone in the room with the intimidating little machines.

What I am getting at is that the architecture of the hardware and software is satisfying the needs of the masses, and we must learn to cope. Coping means finding the right combination to resolve our individual situation. And the more things you do with your computer the more complex it becomes to find those combinations.

It wouldn't really be an advantage to have a computer set up to do only ham activities. Several reasons for that come to mind, not the least of which is expense and being tied to a computer guru to solve your every problem whereupon you would spend the money you should be spending for towers, digitally controlled rotators, and other necessities of life.

The most important reward for understanding how to make your computer do what you want it to do is that you can make changes and update to newer versions of software as soon as it becomes available. You can control the outcome of your computer experience.

Next comes the project.

I just purchased a big book on the Linux operating system. There are tons of free information available on the subject, but it appears the book form is better organized and more concise. We shall see. This was a step I had anticipated for some time and, while looking through Dave's G3VFP Web site, I ran across several ham applications available for Linux.

I asked Dave if he had set up Linux as yet and he said he has given it a spin and seemed positive. So that was favorable. It looks as though a lot of work has been done over the years to cause the system to be user friendly and perform the tasks we expect a computer to do. At least that is the impression I got from thumbing through the book.

The plan is to get some experience and, of course, road test the ham software. Lots

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# HOMING IN

## Radio Direction Finding

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## T-Hunting Fun in the Sunshine State

*Spring will soon be here, so clubs around the country are already planning hamfests and other outdoor activities. Many of them are beginning another season of hidden transmitter hunting. They'll be doing it in vehicles (T-hunting, rabbit hunting) and on foot (foxhunting, radio-orienteering, ARDF). Will your club be among them?*

I enjoy hearing about radio direction finding (RDF) contests all over the USA and the world. Like snowflakes, it seems that no two are alike. Every group has its own idea of the perfect set of rules and boundaries for mobile T-hunting. This month, let's see how it's done on the coast of Florida.

The mention of Daytona Beach brings up visions of race cars and sandy beaches. If you're one of the eight million who visit there in any year, you'll find both of those, and hidden transmitter hunting too. It's a year-round activity for the Daytona Beach Amateur Radio Association (DBARA).

### Bunnies and cowbells

According to Bruce Kalashian KB4GW, "As best I can remember we started about 1980. John Pease WB4VJZ got the idea and passed it around. We all went to work building our first antennas with the help of Bill Schwartz WA4JCP and Bob Haviland W4MB. The first attempts were quite primitive and admittedly mine didn't work very well. I think it was an Adcock-type system and I don't think it was fed properly.

KB4GW continues, "Dave Rusler WA4ZTT hid under the Main Street bridge in a boat, waving an 11-element beam all over the place. One hunter spied him under the bridge but couldn't get to him, and Dave would not admit he was the rabbit! I understand that after some 'extraordinary methods' he finally confessed. There are no witnesses to what the threat was."

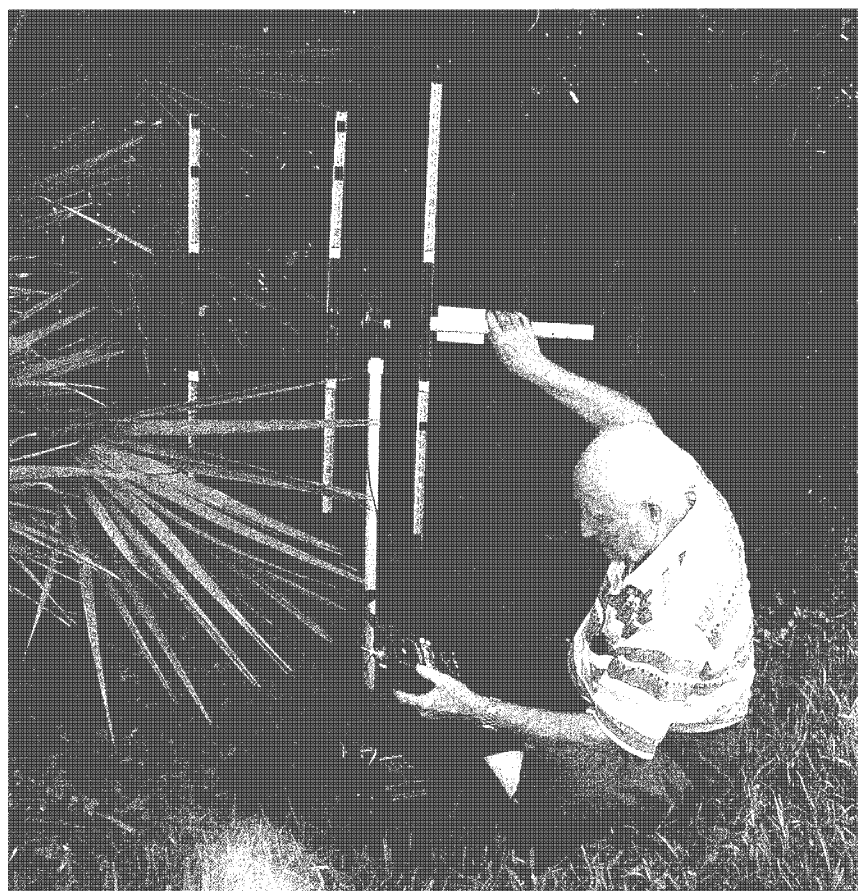
Everyone agreed that this hunt was too difficult for beginners, so the club made hunt rules that required consistent power and a stationary transmit antenna. "The idea was to get the wives to meet everyone and have some fun being out with ham radio," says Bruce. "We decided that the winner of

each hunt would hide next and host a social event afterwards. It was a good idea, but there weren't too many different winners during that time, so a few hunters got the brunt of all the socials.

"As time went by, we had more and more

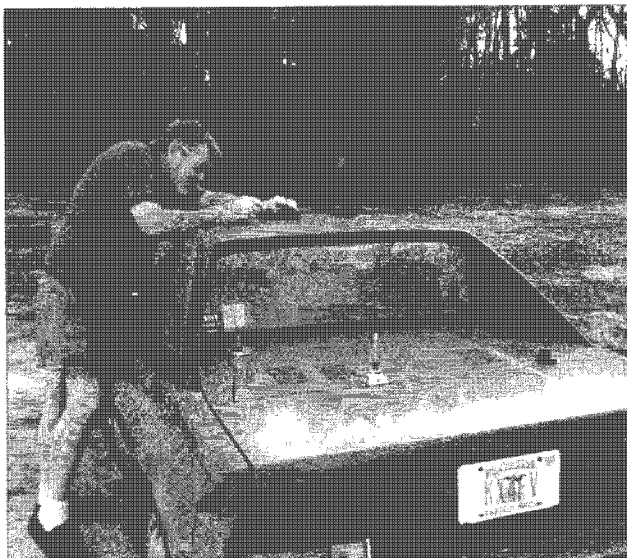
folks hunting, so the gatherings got really big. We went over to Orlando and hunted with the guys over there. At times, 40 or 50 people would show up, four or more in a car. That made it tough on the pocketbooks.

"It became necessary to make a rotating



**Photo A.** Hider John Munsey KB3GK checks the SWR and pattern of his tape-measure beam just before the hunt starts. The strong signal in front of his beam will entice the hunters to come in through a swamp instead of a dry route from the back. (All photos provided by KB3GK)





**Photo B.** Fred Villers KX4FV makes last-minute adjustments to the placement of his doppler whips.

list of who would hide next. That way everyone knew when they were 'up,' so to speak, and could plan for their social. As a

hunters to find him. Of course, more attention was paid to the team getting the cowbell than to the one winning the stuffed

trophy, the winner would get a stuffed bunny to keep until the next hunt. Sometimes, the bunny didn't come back because folks would forget to bring it or drop out of hunting. Then we'd get another bunny.

"Next came the cowbell. One hunter got lost during a hunt and had to be tracked by RDF to get him out of the woods. Awarded to the worst-performing hunter each time, the cowbell would make it easier for the rest of the

bunny. Strangely, the cowbells often disappeared.

"On a hunt in Seminole County, WB4VJZ drove up a driveway that didn't look like one and found himself staring down the barrel of a gun! A couple of shots into the air made his vehicle back out rather quickly. This led to a rule that the transmitter must always be on property accessible to the public, leaving no doubt at all for the hunters.

"On another hunt, Mark Patterson N4HFS drove onto the interstate to try to find the transmitter and had a small but serious enough accident to cause us to make another rule: 'It's not on the interstate, even if you think so.'

"Then, when I was hiding by the Port Orange Causeway,

WA4JCP found the fishing pole that held my antenna, but could not see me. He just grabbed onto the coax and pulled it to himself. My radio jumped out of the hiding place and I was found. So now comes another rule: 'If you find the antenna, you have found the hider.'

"During the beginning hunts, WA4JCP and his partner thought it would be a good idea to have a field strength indicator. Trying to see a panel meter in the dark would be tough, so they built a voltage-controlled oscillator, fed with a detector to sound off when the signal was close, and to indicate which direction.' That little thing became the most important tool for close-in sniffing. We all built one and learned a lot about construction, with help from the designers.

"Then came the doppler. WB4VJZ built the first one in Daytona Beach. The rest of us thought we were all done, and that there would be no way to fool that thing. Well, it didn't pan out that way, though it let hunters keep their hands inside the car. As always, the hunts were won using good DFing techniques, no matter what equipment."

All the T-hunting action in Daytona Beach led to hunts beginning in Orlando and at the Melbourne FL hamfest. According to KB4GW, the Dayton hunters who participated won these hunts almost all the time. Any rebuttals to that claim?

### What's your handicap?

My most frequent Florida T-hunting correspondent nowadays is John Munsey KB3GK (Photo A), who usually teams up with Bill Thomas KE4HIX. John writes that hider-hosted socials are a thing of the past. For the last three years, the hunters have gathered at a restaurant near the hidden transmitter instead. Gone also are the requirements for stationary antennas and steady power. "After all," John writes, "a malicious jammer would not follow such rules, so why should we limit our foxes?"

DBARA sponsors a hunt about once each month. There is no fixed schedule because special events, car races, and Spring Break have a great effect on traffic. Those dates are avoided in the interest of safety.

According to KB3GK, "Most of our hunts are at night and are a combination of mobile and on-foot. Usually the hider's plan is to lead the mobiles into an area where the on-foot hunting will take place, such as a park. Most parks in this area officially close one hour after sunset to reduce crime and prevent them from being used as campgrounds. Fortunately, the local police have been cooperative by extending that time whenever requested. Of course, if we post



**Photo C.** Arthur (KA4WDK) and Victoria (KB4KVP) Byrnes mount their doppler antenna set on the back of the vehicle, with help from young AJ.



a sign at the entrance to announce extended hours, it's a giveaway.

"To even the odds, the winner of a hunt has a five-minute handicap on the next hunt," John continues. "To lose the handicap, that hunter has to be second or worse in the next hunt. If he wins again there is an additional five-minute handicap. These handicaps continue until the hunter loses a hunt. Some hunters have won with a fifteen-minute handicap.

"We have two five-watt foxes built into ammo boxes. They usually run one minute on and two minutes off. We also have four smaller foxes using Alinco credit-card-size radios at 200 milliwatts output that are controlled with PicCon controllers.<sup>2</sup> In addition, we have PicCon controllers for both Kenwood and Icom mobile radios for the longer-range hunts.

"Dopplers are very popular among Daytona hunters, including Fred Villers KX4FV (**Photo B**), the Byrnes family (**Photo C**), and my team. On the other hand, Pat Eckenrode AC4QM (**Photo D**) and John Greiff N4UJU (**Photo E**) insist that quads are the only way to go.

"On foot, several of us use the tape measure antennas from the Web site of Joe Leggio WB2HOL.<sup>3</sup> Rather than build with PVC pipes, some hunters use wood dowels, as they are much lighter (**Photo F**). We also have two of the HB9CV antennas from Ron Graham as well as a special one he made for the 70 cm band."

KB3GK and KE4HIX hid the December 2001 hunt. "It was planned to be tough," reports John, "but things don't always go as planned. The first transmitter, running 750 milliwatts into a J-pole antenna, was at the boat ramp in Bethune Point Park. We expected this transmitter to be easy to find, but it would scatter the teams so that they could not 'follow the leader' to number two. As it turned out, number one gave hunters the most trouble, taking them almost two hours to complete what was expected to be a 20-minute hunt.

"Both hunting teams drove into the park at least once, looked for the antenna but failed to find it," John continues. "They both passed within 25 feet but the transmitter was cycled off and they missed it, even though Bill was parked in his white Jeep in the middle of the parking lot for all to see. We suppose that they were thrown off by the signal not being near the vehicle and thought it was a decoy.

"The park officially closes one hour after sunset. We had contacted the police and received an OK to stay until 11 p.m., if necessary. We prepared a handout clearly



**Photo D.** Pat Eckenrode AC4QM is close to finding another transmitter in the woods with his strung-wire quad.

stating that we would be in a semi-private area but that we had permission to be there. However, we failed to cover a sign on the gate at the entrance. Although hunters came and went they were uneasy about entering the park after the sign said it had officially closed.

"This transmitter was finally found when one hunter returned to the boat ramp to answer a 'call of nature.' While doing so, he looked up and saw that he was standing beside the boat ramp sign and that the J-pole was mounted on top of the sign. The second team was given some hints so that they could find it and everyone could proceed to hunt number two.

"The second transmitter was near a church on the east bank of the Halifax River. This mini-fox ran 300 milliwatts and was attached to the end of a pier. Both teams found it within forty-five minutes of finding number one. Hunters said they thought at first that it must be in the middle of the river, but were soon able to locate it without much trouble. So much for planning a tough spot!

"The team that found number one first was last at number two. The team that was last at number one was first at number two. That team had been given a strong hint as

to where number one was located. Was this a standoff?"

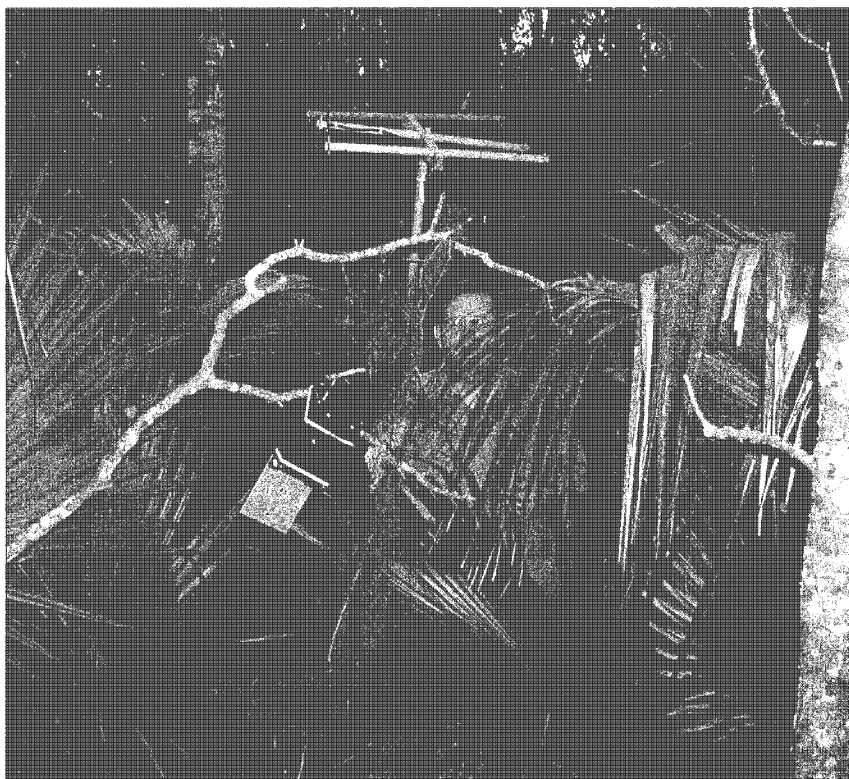
### Join the Fun

As this issue of 73 goes to press, John and Bill are putting on a transmitter hunt for the Orlando HamCation hamfest. "It draws hunters from all over the southeast and from as far north as New Jersey," says John. "We have won three times in the past four years and the year we didn't win we were the hidlers. We have not developed plans for 2002 yet, but will do as much as we can to make it difficult."

DBARA hunters continue to promote T-hunting elsewhere in the Sunshine State. "Lake County is trying to renew their activity," KB3GK reports. "Bill and I have been asked to help. We will show them our equipment and organize a building class to get them started."

Next time you're on Florida's east coast, get together with the DBARA hams for foxhunting fun. They are on the lookout for new hunters, because three teams from Embry Riddle Aeronautical University recently graduated and moved away. "We will help anyone interested in transmitter hunting with the building of equipment and basic training in hunting skills," says John. "You





**Photo E.** John Greiff N4UJU crashes through the palms to find a hidden transmitter with his well-worn stiff-wire quad.



**Photo F.** Arthur Byrnes KA4WDB and son AJ (behind the park bench) do practice hunts like this to check their steel-tape beam RDF setup.

can log onto the DBARA Web site [[www.dbara.org](http://www.dbara.org)] and leave a message. Daytona hunt dates and details are posted on this site, too."

If you don't live on the sunny Florida coast, get together with hams in your own area to start the ball rolling. Don't be intimidated by your local RDF "experts," because with just a little effort, you can be competitive, too. According to KB4GW, "Everyone makes mistakes. The team that wins is the one that makes the fewest on that day. We have all been very good and very poor. It is a very active way to enjoy ham radio. It started me on the road to building and learning about electronics, and it provided fellowship with other hams that I might never have known otherwise."

What's unique about the T-hunts in your area? Let me know and I'll spread the word here in *73 Magazine*. Your hunt photos are always welcome, too. Send E-mail and postal mail to the addresses at the beginning of this article.

#### Footnotes

1. Construction plans for field-strength meters, including a voltage-controlled oscillator version, can be found in the book *Transmitter Hunting — Radio Direction Finding Simplified* by Moell and Curlee, published by TAB/McGraw-Hill, ISBN number 007-1560068. This book also includes plans for a doppler RDF set, and strung-wire and stiff-wire quads.

2. Available from Byon Garrabrant N6BG, 8378 Granite Mountain Lane, Las Vegas, NV 89129 [<http://www.byonics.com/>].

3. For links to the WB2HOL antenna projects and the Ron Graham HB9CV antennas, see the "Equipment for Radio-Orienting" page of the "Homing In" Web site [[www.homingin.com](http://www.homingin.com)].

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**Say you saw it in 73!**



# Elmers Applaud Ham Ambassador Program

*Progress!*

*Ham instructor William Alber WA6CAX has just completed another successful Technician class with public safety and search and rescue personnel, and offers the following comments for any new Elmer: "Start off that first class with glossy color frequency charts and maps at each table and chair."*

I start out with a tape-recorded tour of the radio spectrum, and I zero in on the ham bands that they see right on their manufacturer-supplied band charts," adds Alber, pointing out the large map from Yaesu, Kenwood VHF/UHF band plan color chart, and Alinco and Icom America frequency privilege charts.

"For every class session, the students sit down in front of new manufacturer-supplied materials," he says. Alber has found dealer catalogs from Ham Radio Outlet, Universal Radio, and Amateur Electronic Supply to be very useful. Occasionally, ham hats and ballpoint pens are available, too.

"At graduation, our students receive a \$20 gift certificate from Icom America on any new Icom radio from an authorized Icom dealer, plus a colorful graduation certificate from our textbook supplier, W5YI Group. Our students could also receive a free ARRL book if they would sign up for League membership at the conclusion of our class, and giving out magazines from the publishers is another great way to keep their interest high throughout the entire course," adds Alber.

Manufacturers and ham dealers are endorsing the Ham Ambassador free training materials program because it allows them to get their expensive educational/promotional materials in the hands of brand-new students who have yet to buy their new ham radio.

"While the brand-new students may appreciate our charts, it is the ham Elmers and instructors who probably

appreciate them more," comments one manufacturer's representative.

"And if that ham instructor appreciates what we are doing for him or her, no doubt they will be promoting our brand of equipment to those students ready to go out and make a purchase."

From what Icom America tells me about their glossy stock band charts and maps, plus their \$20 graduation

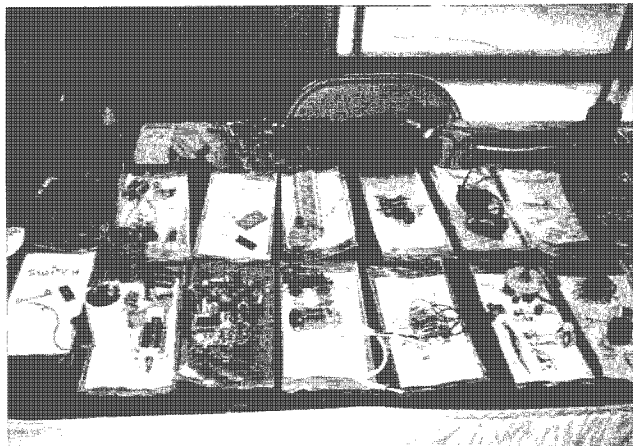


*Photo A. Live, operating radios are a must!*





**Photo B.** In the classroom, too, you need a live radio — here, a 10m Ranger.



**Photo C.** Present lots of show-and-tell electronic parts.

gift certificate, the Ham Ambassador free-materials program is working swell.

The W5YI Group goes one step further and may supply an instructor's no-code Technician time-line teaching guide that keeps the instructor on track, and gives the instructor some handy demo ideas and demo sources that have made my Gordon West Radio School ham classes a nationwide hit.

Instructors may purchase W5YI books, tapes, and computer training disks at a discount, and with their instructor purchase comes the time-line training guide written by this author to point out some of the sources of demo materials, and some of the successes of

using live-action demos to help teach the class.

"I would not have believed that soft foam rubber balls could help explain ground waves, direct waves, and sky waves," smiles Alber, pointing out that the instructor and students had a great time sending balls all over the classroom to depict different types of radio wave propagation.

"But I followed the suggestion in the W5YI no-code Technician class instructor guide, and sure enough, when it came time to show radio waves in action, the demo was a major hit," adds Alber.

Many of the classroom demos are ideas from other ham Elmers across the country. Rick and Lil Marvin,

KL7YF and NL7DL, came up with the described demonstration in the RF safety section on using low wattage light bulbs and low wattage reflector lamps to illustrate antenna radiation patterns. Next, the demo involves having a student come up and the suggestion of whether or not they would like to firmly grasp the lit light bulb and hold on to the hot bulb continuously. Obviously the students would decline.

Would they put their fingers a half inch away from the lit bulb, and hold them there continuously? Nope, the students would claim that this was still too close for "comfort."

Then the Marvins would teach all about RF safety and tell the students that the same principle of getting



**Photo D.** Use that Slinky to demonstrate frequency and wavelength.



**Photo E.** Instructor Julian Frost N3JF offers a live demo of 6m E-skip.





**Photo F.** The Blazing Pickle is a great AC voltage demo described in the W5YI instructor book.

burned or overheated by a turned-on light bulb is a good example of getting too close or touching an energized ham antenna during transmit. The reflector bulb goes one step further to show how a yagi antenna may work — all of this is described in the W5YI no-code Technician teaching time table available to instructors purchasing the Gordon West training materials.

The free training materials are available to any instructor who will send in \$5.95 in stamps to cover Express Mail postage for some of the on-hand materials. Since many of the radio equipment manufacturers are West Coast-based, the materials come out of Gordon West Radio School.

At the same time, ham dealers and publishers are notified of a request for

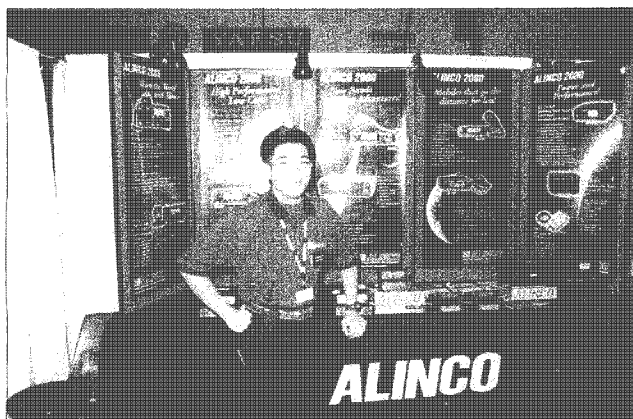
training materials, and these catalogs and sample magazines may be sent out of their headquarters in different parts of the country. The better documentation you might send on your upcoming class, the better the response from ham dealers and publishers.

The Ham Ambassador program wants to help YOU for a successful class because all of us in the industry know the importance of keeping our ham numbers up to hold our valuable frequency spectrum. Now that Federal Communications Commission restructuring leads to a relatively easy and straightforward no-code Technician class path, the industry wants to help YOU attract more ham operators with your classes. More professionally-run classes, MORE HAMS!

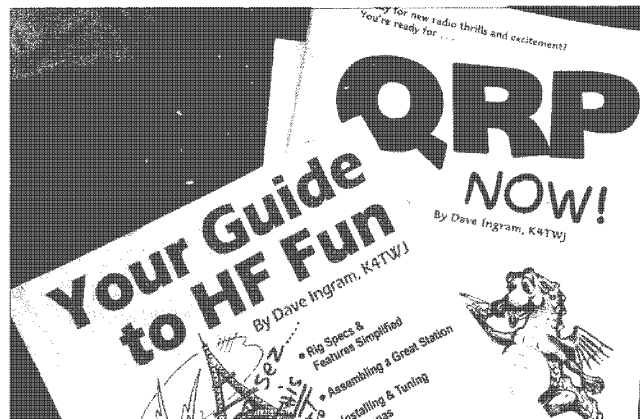
The training materials that you give out in class will help promote better understanding of frequencies, band plans, and operating regions, plus put that manufacturer or dealer's name in front of a brand new equipment-buying student. It also gives an opportunity to the W5YI Group to share with you their instructor training materials discount program, plus additional textbooks that may go into even more detail on some of the technical answers behind the questions.

As this Ham Ambassador program matures, it is my vision to work on a program that rewards YOU, the instructor, with a potential of purchasing demo ham radio equipment at an instructor's discount through participating ham radio dealers. I can tell you right now that there are several instructor teams throughout the country that have such well-known ham classes that the local dealers would certainly give them a break on demo gear purchases. My vision is to take this program one step further and have manufacturers work closely with dealers to give those really hot Ham Ambassadors a DEALER EMPLOYEE-type discount on the equipment they plan to use in the classroom.

The American Radio Relay League will reward Ham Ambassadors for taking sign-ups for ARRL membership right in the classroom with either a free book for each student signing up, or a monetary spiff back to the instructor team handling the ARRL membership drive. Keep in mind that the



**Photo G.** Many manufacturers are ready to help instructors "teach class" with their training materials.



**Photo H.** Books from Dave Ingram tie in well with classroom antenna and rig demos.



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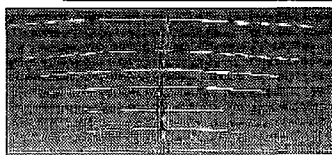
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ARRL has a powerful in-house registered instructor program, and I especially like their video library loan program, offering League-registered instructors over 20 exciting short videos to better illustrate specific subelements out of the question guides.

Sign up now to become a Ham Ambassador, and include with your letter a class flyer on your upcoming course. To start off the flow of materials, include \$5.95 for up to 2 pounds of training materials, and send your request to Ham Ambassadors, Gordon West Radio School, 2414 College Drive, Costa Mesa CA 92626.

Thanks to *73 Magazine* for all its support of the Ham Ambassador program, and be sure to let your students know that *73 Magazine* is indeed a "must read" every single month! 73

## Switched Mode Power Supplies

*continued from page 16*

MBR1045 Schottky diodes and D3 and D4 are MUR110 ultrafast silicon rectifiers. The MOSFETs, Q1 and Q2, are TEMIC Si4980DY. They have an  $R_{DS(on)}$  of about 0.070 ohms and a total gate charge of 15 nC with an 80 volt drain voltage. With a 13.8 V supply, the Miller effect will be less and  $Q_T$  correspondingly less.

**Fig. 6** shows an SMPS with an output of 28 volts at 1 ampere. The line regulation is about 14 mV while the load regulation is about 3 mV. The efficiency is about 70%. 73

## Vent-a-Fume

*continued from page 18*

cabinet to protect your work surface from scratches and to prevent the unit from vibrating across the surface of the bench.

Wiring completed, metal pieces assembled, and suitable duct hose attached, your new fume removal device is ready for operation. And there you have it! One power supply recycled to perform a needed health function, while providing the enjoyment of creating

another useful project. The total cost: \$2.90 for the "starting collar," plus the shelf paper (?), plus the paint (?), plus the feet (\$.90), equals \$3.80. Add another \$7.00 or so for the flex tubing and you're up to about \$11.00. Your cost may vary depending on the power supply available for "recycling" and how "full" your junk box is. The paint and paper used were parts from previous projects; the paint sells for about five bucks and the paper is about two bucks a yard.

Alas, now it's back to the chore of "clean-up." Hey, I wonder what else is there that can be remolded into another project? 73

## One Repeater to Go, Please!

*continued from page 30*

For the most portability I recommend carrying the box, a gel cell and a magnetic mount antenna. If you can access a building rooftop and set the antenna on a metal structure such as an air conditioner, you should significantly improve your coverage area. If you are lucky enough to have access to a vehicle at a high point you can use the vehicle as an antenna mount and the battery as your power source.

While FCC rules can be ignored when there is an immediate threat to life or property, disaster recovery does not qualify. In fact, it is even more important to follow the regulations as well as good amateur practice during rescue and recovery efforts. As such, it is not a good idea to set this repeater up and walk away. Without automatic or remote control and an identification method, this system needs to have a control operator. Besides, during disaster situations looters are known to steal anything not nailed down. I'd use a location close to the repeater as the command and control site and use the control operator for other duties as well.

While this is not the most exotic repeater you'll ever see, in a pinch it just might prove its worth. Besides, it's a quick and easy project that has some real-world applications. 73



## Understanding the CWTHA

continued from page 32

4 to 10 dB. At the second resonance, the azimuth pattern is a figure eight. Efficiencies at first resonance are very low; they range from less than 1% for 20 turns to 1% for 10 turns.

### Footnotes

1. J.F. Corum, Toroid antenna, U.S. patent 4,622,558, Nov. 11, 1986.


2. R.C. Hansen and R. Ridgley, Modes of contrawound toroidal helix antenna, *Microwave Opt Technol Lett* 23 (1999), 365-368.

3. M.A. Tilston and K.G. Balmain, On the suppression of asymmetric artifacts arising in an implementation of the thin-wire method of moments, *IEEE Trans Antennas Propagat* 38 (1990), 281-285.

4. T.S. McLean and F. Rahman, Small toroidal antennas, *Electron Lett* 14 (1978), 339-340.

5. R.C. Hansen, Superconducting antennas, *IEE Trans Aerosp Electron Syst* 26 (1990), 345-355.

### Additional reference

R.C. Hansen, Fields of the contrawound helix antenna, *Trans. IEEE*, Vol. AP-49, August 2001, 1138-1141. 

## MFJ's 1899T

### Portable Antenna


continued from page 35

well as the BNC. The MFJ-1899T is only available in the BNC version. I was informed that the BNC connector is really an RCA to BNC adapter. I found that with a little persuasion, the BNC adapter could be removed and replaced with an RCA to PL-259 adapter (Radio Shack catalog #910-0700). The friction fit of the connectors is good and solid.

### Final thoughts

The MFJ-1899T is a good all-band antenna for portable/remote operation with any low power portable rig under 25 watts of power. It qualifies as portable, lightweight, easy to assemble, and easy to change bands with. And the fact that it works great helps a lot!

For more information on ordering the MFJ-1899T (\$129.95), contact MFJ, 300 Industrial Pk. Rd., Starkville, MS 39759; tel. (662) 323-5869; [http://www.mfjenterprises.com].

I would like to thank Joe NA1X for his involvement in this product evaluation. 

## QRP

continued from page 44

inductance coils that may be used to tailor the audio response of the radio. They won't fit the PC board, as their lead spacing is not the same as the original one. However, a small hunk of perfboard would be ideal to use.

A handful of Mylar capacitors would round up the parts needed. Although you could sit down and calculate the values needed for the components based on frequency, cut-and-try is a lot more fun.

If anyone decides to try to improve the overall operation of the HW-7, I hope he will share the results with the rest of us.

### Some HW-7 fixes and improvements

With some HW-7 radios, you can improve the sensitivity by placing a small jumper wire across C6 on the foil side of the PC board. Then remove R1, a 100k resistor. If you don't see any improvement or the radio fails to operate, replace the resistor. Some HW-7s will improve, others won't.

If the audio seems down, replace R411, 10k, with a 1k resistor. Again, this fix will only show up in the first run of kits. Older HW-7s will more than likely have the values changed.


### Service hints

The Colpitts oscillator operated on 3.5 to 3.6 MHz and doubles to 7.0 to 7.2 MHz for 40-meter operation. For 20- and 15-meter operation, the oscillator runs at 7.0 to 7.1 MHz, and doubled for 20 meters, 14.0 to 14.2 MHz, and tripled for 15 meters, 21.0 to 21.3 MHz.

The following are typical RF readings. Gate of Q3: approximately 1 volt RMS. Base of Q4: approximately 0.8 volt RMS. Collector of Q4: sine wave with harmonics. Base of Q5 in transmit: 1 to 2.5 volts RMS. Base of Q6 and Q7: 1.5 to 2.5 volts RMS. RF output across a 50-ohm load: should be approximately 10 volts RMS on all bands. Typical RF voltage readings at

the detector FET Q1 are 0.6 to 1 volt RMS nominal. Any injection appreciably less than 0.4 RMS will give a loss of sensitivity.

Next time we meet, I'll have some information about the upcoming Five Days In May program being held this coming spring at the Dayton Hamvention. FDIM is sponsored by the QRP Amateur Radio International. It is held at the Ramada Inn just south of downtown Dayton. For the last several years, it's been sold out. I would suggest that if you plan on attending this year's FDIM, you get your tickets early.


If you want more information before you see it here in print, then point your Web browser to [www.qrparci.org]. There, you can access the latest information dealing with FDIM. 

## THE DIGITAL PORT

continued from page 50

to learn. I will let you know how it goes as I progress. I have talked to hams who work with it and at least one who was using it with his rig.

The advantage? I am not sure if I can conclusively say this at this point in time, but it would be nice not to depend on the whims of Microsoft as to whether my tried-and-true programs will be outmoded by an operating system. Fascinating idea, to say the least.

That's about it for this month. If I have you thoroughly confused or you just plain have questions, give me a shout via [KB7NO@worldnet.att.net]. 73, Jack KB7NO. 

## NEVER SAY DIE

continued from page 8

by drilling ice cores in the ice pack with the North Greenland Ice-core Project (North GRIP)? Basically, there have been ice ages that lasted about 90,000 years, followed by warm periods which lasted 10,000 years. The bad news is that the present warm period started about 10,000 years ago. Even worse, the cores show that the transition took only a few years. They were very sudden.

The scientists don't know what's caused these sudden transitions, where in a few years the earth's temperature has risen and fallen by as much as 20 degrees. It could be due to volcanic activity warming the oceans. Or it could be due to variable solar activity.

Continued on page 61



## Special DX Forecast

*March is usually quite good for DXing on 15 and 20 meters, which typically improve as the month progresses.*

As the weather warms up, decreasing MUFs will curtail activity on 10 meters while atmospheric noise suppresses traffic on 40 meters and above. Central Asia, India, and the west coast of Africa will all provide good opportunities to snag unique stations, but the Arctic and Antarctic will be the hot spots for those seeking rare QSLs since the morning and evening gray-lines will pass near those areas this month.

My solar activity charts show only a few periods when our ionosphere and geomagnetic field might become notably disrupted. Overall, expect a high daily flux level and low geomagnetic index to provide solid openings across the globe. The 10th to 15th looks like an unusually quiet stretch with excellent propagation conditions likely. Other good days include the 19th, 20th, 29th, and 30th. The 3rd through 7th and 21st through 25th look particularly poor however, so expect moderate to strong flares or CMEs followed by particle storms lasting up to 48 hours. The 15th, 26th, and 31st also show some potential for trouble, so expect mostly poor conditions on those days.

This month the annual SOHO symposium will be held in Switzerland. As always we can expect some new and interesting scientific data to be released regarding the sun. Of particular interest to us is new data regarding the current solar cycle. Another important topic this year will cover how changes in solar irradiance are influencing global climate. I'll be sure to relay the pertinent tidbits as I get them. SOHO stands for "Solar and Heliospheric Observatory" and is the high-orbit satellite that has been our primary solar observation platform since 1996. Be sure to check out the SOHO Web site at [http://sohowww.nascom.nasa.gov].

73 and good hunting!

March 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
					1 F-G	2 F-G
3 F-P	4 P	5 P	6 F-P	7 P	8 F	9 F-G
10 G	11 G	12 G	13 VG	14 F-G	15 P	16 F-P
17 F	18 F-G	19 G	20 G	21 F-P	22 P	23 F-P
24 F-P	25 F	26 F-P	27 F	28 F-G	29 G	30 G
31 F-P						

EASTERN UNITED STATES TO:												
GMT	00	02	04	06	08	10	12	14	16	18	20	22
Central America	(15) 20	(15) 20	20 (40)	x	x	x	(10)	(10)	(10-15)	10 (17)	10-15	12-20
South America	(17) 20	20 (40)	20 (40)	(20-40)	x	x	x	(10)	(10)	(10-15)	10-15	10 (20)
Western Europe	(20-40)	(30-40)	(30-40)	(40)	x	x	(15-20)	(10-20)	(10) 17	15-20	(15) 20	(20)
Southern Africa	(17) 20	(20-40)	(20)	(20)	x	x	x	x	(10)	10 (15)	12 (17)	(15-20)
Eastern Europe	x	(30-40)	(20-40)	(17-20)	(20)	x	x	(10-15)	(15)	(17-20)	(20)	(20)
Middle East	x	(20)	20	(20-40)	(40)	x	x	x	(10-15)	15	(17-20)	(20)
India/Pakistan	(17-20)	x	x	x	x	x	x	(15-17)	x	x	x	x
Far East/Japan	(17-20)	(20)	x	x	x	x	x	x	x	x	x	(15)
Southeast Asia	(17-20)	x	x	x	x	x	(17-20)	(10-15)	x	x	x	x
Australia	(15)	(17-20)	x	x	x	x	(20-40)	(20)	(10)	x	x	x
Alaska	(15) 20	(20)	(20-30)	(30-40)	(40)	x	x	x	(15-20)	(10-20)	(10) 17	15-20
Hawaii	(15) 20	20	(20-40)	(20-40)	(40)	x	x	x	(15-20)	(10-20)	(10-20)	15-20
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South America	(15) 20	17-30	20 (40)	20 (40)	x	x	x	(10-20)	10 (20)	10 (15)	(10-20)	12 (20)
Western Europe	(20)	(40)	(40)	x	x	x	x	(15)	(15-17)	(15-20)	(17-20)	(20)
Southern Africa	20	(20)	(20)	(20)	x	x	x	x	(10)	(10-15)	(10-17)	(15-20)
Eastern Europe	(20)	(20)	x	x	x	x	x	(15)	(15-17)	(17-20)	(20)	(20)
Middle East	x	x	x	x	x	x	x	x	(15)	(15)	(20)	(20)
India/Pakistan	(17-20)	(15-20)	x	x	x	x	x	(15-20)	x	x	x	x
Far East/Japan	(17-20)	(20)	x	x	x	x	x	x	x	x	x	(15)
Southeast Asia	(15-20)	x	x	x	x	x	x	(20)	(10-20)	x	x	x
Australia	(15-20)	(20)	x	x	x	x	x	(15-20)	(15-20)	15	15	15 (20)
Alaska	15-20	(15) 20	20	20 (30)	(30-40)	(40)	x	x	x	(10-20)	10-20	10 (20)
Hawaii	15-20	(15) 20	20 (40)	(30-40)	(40)	x	x	x	x	(10) 12	10-15	(10) 17
WESTERN UNITED STATES TO:												
Central America	10-20	15-20	15-30	(14) 40	20-40	(30-40)	x	(15-20)	10 (20)	10 (20)	10 (20)	10 (20)
South America	(10) 20	(15) 20	20 (40)	20 (40)	x	x	x	(10-20)	10 (20)	(10-15)	10 (15)	10 (20)
Western Europe	x	x	x	x	x	x	x	x	(15-17)	(15-17)	(17-20)	(17-20)
Southern Africa	(20)	(20)	(20)	(20)	(20)	x	x	x	x	(10-12)	12 (17)	(15-20)
Eastern Europe	x	x	x	(17-20)	(17-20)	x	x	(15)	(15)	(15-17)	(17-20)	(20)
Middle East	x	(20)	(20)	x	x	x	x	x	(15-17)	(20)	(20)	(20)
India/Pakistan	x	(17-20)	x	x	x	x	x	x	(15-17)	x	x	x
Far East/Japan	10-20	(20)	x	x	x	(40)	(40)	x	x	x	x	(10-20)
Southeast Asia	(10-15)	(10-15)	x	x	x	x	x	x	x	(15-20)	(15-20)	(10-15)
Australia	(10-15)	(15)	(17-20)	x	x	x	x	x	(15) 20	(15-20)	(15)	(10)
Alaska	(10) 20	(15) 20	20 (40)	(20) 40	(30-40)	(40)	(40)	(40)	x	(10-15)	10-15	10-20
Hawaii	(15) 20	20	(20-40)	(20) 40	(30-40)	(40)	x	x	x	(10-20)	(10) 20	15-20
Western USA	15-20	20 (40)	20 (40)	(20) 40	(30-40)	x	x	(10-20)	10 (20)	10 (20)	10 (20)	(15) 20

**Table 1.** Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



## Band-by-Band Summary

### 10–12 Meters

As always, these are daytime-only bands with openings generally following the path of the sun from sunrise to sunset. Look for strong signals from stations in Western Europe, Japan, or Korea. Expect both 10 and 12 meters to worsen toward the end of the month as Maximum Usable Frequencies (MUFs) Short-skip distances will usually fall between 1,000 to 2,500 miles.

### 15–17 Meters

Should be quite good as daytime bands and should even stay open for awhile for stations located in the southern U.S. Expect signals to peak toward the east in the morning, to the south around midday, and to the west later in the afternoon. Short-skip is expected to be about 1,000 miles.

### 20 Meters

As usual, this will be your best overall band and should provide the most hours of good DXing. Expect openings to begin after sunrise and last well into the evening. Your more exotic contacts will probably occur between sunset and midnight as day begins in Central Asia and the Indian Ocean. Try both polar paths for a shot into Afghanistan and Pakistan. Short-skip will vary widely between 500 and 2,500 miles.

### 30–40 Meters

30 and 40 meters will be best for DXing from late evening until sunrise. Activity on these bands is sure to taper off as warm weather arrives and atmospheric noise increases. Africa, the Middle East, and Asia are good hunting grounds for some of your rarer opportunities, but Central and South America will tend to dominate prime-time hours. Short-skip will be less than 1,000 miles during the day and greater than 750 miles at night.

### 80–160 Meters

These bands will certainly begin deteriorating early in the month as springtime storms begin brewing in the subtropics. However, they're still worth checking out, especially if 40 meters is active. Short-skip on 80 will be over 2,000 miles at night and around 300–400 miles during the day. Short-skip on 160 meters will average between 1,000 and 2,000 miles at night.

**Say you saw it in 73!**

## NEVER SAY DIE

*continued from page 59*

We're experiencing unexplainable solar activity right now, with the first double maximum of sunspots in history. The Sun is acting up and we have no clue yet what that might do to our climate.

Have you read *Not By Fire, But By Ice* by Robert Felix? Have you yet read Chet Snow's *Mass Dreams of the Future*? They're in my *Wisdom Guide*.

With about 80% of humans living within 40 miles of an ocean, mile-high sloshing of the oceans from a sudden pole shift could easily wipe most of us out.

And that brings up the third event you can worry about. If the Pacific Ocean, which is being heated by thousands of new undersea volcanoes, warms the western Antarctic ice shelf enough, a huge section of the ice cap could suddenly slide off into the ocean, creating a wave traveling at around 500 mph and a thousand or two feet high, going all the way to the North Pole. What few people who manage to survive this would be without power, food, or heat. Permanently back on foot again. There will be little warning since it would take a tsunami only about 15 hours to reach Los Angeles — barely enough time to get through baggage inspection at the airport.

While the calving off of the ice from the western Antarctic ice shelf has been spectacular, that was already floating ice, so it hasn't affected the average sea level. But sliding a whopping ice cube into the sea could raise the sea level over a hundred feet. Good-bye coastal cities. Well, I'm glad I'm living 1,000 feet above sea level.

### Global Warming

If you believe all that BS about global warming, you probably also believe that NASA put a man on the Moon. Yeah, we've been Gored by tons of propaganda, and the hand-wringing over the Kyoto Treaty, which our rotten American government won't sign.

The world is getting colder. The animals know it. The birds know it. The trees know it. How come we're the last to get the message?

A 90-year-old Vermonter says that during his first 75 years he recalls only one moose sighting. Now moose sightings in Vermont are common. The moose know it's getting colder.

Arctic nesting birds such as the snowy owl and northern diver have returned to the British Isles after leaving a hundred years ago. They've even been seen in Washington. The number of geese wintering in Washington and Oregon has

increased 500% in the last 25 years. The birds know it's getting colder.

115,000 years ago, the climate went from warmth like we have today to glaciers in less than 20 years, wiping out the elm and oak trees. Today elms in New England are dying.

In 1960, all of Tennessee was in the USDA hardiness zone 7. Today, three quarters of the state is in hardiness 6. The plants know it's growing colder.

### Glaciers Melting

The glaciers in Norway, Sweden, Ecuador, Canada, Switzerland, and the United States are growing. The Nisqually Glacier in Washington has been growing thicker by 18 feet a year as measured by geologist Jack Sauer, a 73 reader.

But what about the rising oceans? And those huge blocks of ice breaking off from Antarctica as reported in *Time*? Measurements at Pacific islands show that the oceans have gone down a few inches over the last ten years.

Land and atmospheric temperatures have been going down, while ocean temperatures have been going up. Hmm, what's going on here?

Ten years ago, scientists counted about 10,000 undersea volcanoes. Now NASA's Web site estimates there are as many as one million volcanoes under water.

Vermont had the most snow and the longest winter in recorded history last year. Mongolia had ten times the normal amount of snow last winter.

### The Ice Cap Meltdown

In 1942 six P-38s and two B-17s were forced down by a blinding storm in Greenland. The 25 crewmen made it back safely nine days later. The planes were abandoned. Forty years later, with P-38s now collector's items, 12 expeditions have tried to recover one of those planes. One was finally found, but instead of being about 40 feet down, based on satellite measurements, they had to melt a tunnel down 268 feet to the plane. So much for the ice caps melting.

### The Drug War

Having learned nothing from the Prohibition disaster, which gave us the Mafia and organized crime but had no effect on the availability of liquor, we launched the "War on Drugs." This super debacle, which was recently chronicled on PBS for the disaster it has been, hasn't made any significant impact on drug use. Drugs are available anywhere, and are cheaper than ever. It has poured billions into the economies of Colombia and Mexico, and more than doubled our prison population — at a housing cost of



about \$30 billion out of our taxpaying pockets.

The illegal drug industry is doing great, and the kingpins will spend what it takes to ensure that Congress doesn't make a move to legalize drugs.

Ending Prohibition almost immediately cleaned up the liquor industry, forcing organized crime to turn to gambling and the development of Las Vegas casinos.

It's the fantastic profits that selling drugs provides that has resulted in over a million more Americans being put in prison. It's also made it very profitable for customs agents and police. The corruption in Mexico went right up to the president.

I won't go into my proposal for legalizing drugs — I've detailed it in my past essays — but I'd much prefer to see the hundreds of billions of profits going into state and federal treasuries so legislatures and Congress would have more money to spend on their pork and do-good (but invariably destructive) social projects. Congress has an enviable record of spending every dollar they can get their hands on. Or borrow. So have state legislatures.

## Melanomas

These are the top cancer-related cause of death to 25–30-year-old Americans. Alas, the drug companies haven't yet been able to come up with a drug.

Hey, guys, it's weakened immune systems are causing the trouble, not the sun — nor a lack of interferon alpha-2b or some other patented concoction. Our ancestors spent most of their days in the sun and they didn't get any melanomas.

According to Dr. Lorraine Day and several other reports I've read, when two groups of lab animals get the same amount of sun exposure, with one group eating the standard American diet and the other fed raw foods, only the American diet group gets melanomas. So, if you're going to nosh at McDonald's, stay the heck out of the sun. At least you'll have a better chance of living at least into your 50s before your diet-caused heart attack — probably preceded by a few \$25,000 bypass operations.

## Days Inn

D'ja see their ads offering a free interactive kid's educational CD-ROM from Golden Books or Encore to anyone staying at their hotels? AAA members get two free CDs. Good promotion.

'Course, I dunno if the programs are any good. Please let me know if you've tried any of 'em on your kids, grandkids, or great-grandkids.

## Lied To

Wait'll you read *You Are Being Lied To*, a whopping 9- x 12-inch book, and over one-inch thick (400 pages), subtitled: "The Disinformation Guide to Media Distortion, Historical White-washes, and Cultural Myths." If you are not already a social pariah for passing along my exposing of disinformation, this will finish the job. The editors have rounded up dozens of experts to debunk just about everything that you passionately believe in. Or, at least, that the major media believe in — which, sadly, is usually the same thing.

Do you believe that two youngsters did all that shooting at Columbine High? Do You believe that one truck bomb was all that was involved at Oklahoma City? And so it goes with the uncovering of one government-media cover-up after another — about text books, our schools, the Big Bang, Alcoholics Anonymous, Al Gore, John McCain, Columbus, and so on.

I infuriated many devout Christian readers when I published an essay about one chapter of this book which made a good case for Jesus being a myth. The author of that article does make a very good case, but I'd like to hear him debate the subject with other scholars such as Glen Kimball (*Hidden Stories of the Childhood of Jesus*).

It's such a huge book that it's going to take me a long time to read it all, but everything I've read so far has been fascinating. And those events that I've independently researched, I've found fairly covered.

The book is \$20 and published by The Disinformation Company, 419 Lafayette Street, New York NY 10003, ISBN 096641007-6, 2001, [www.disinfo.com].

I talked about the book on the Art Bell show and wiped out the inventory of almost every bookstore in the country, including Amazon.com.

## Survival

By now you understand that our borders are almost wide open, allowing our enemies to come and go as they please. You know that hundreds of tons of drugs are being smuggled into the country, so bringing in explosives, suitcase nukes, or bioweapons is no problem. And you know that our national security system is ineffective, to put it politely.

You also know that there are a bunch of bad guys out there who are willing to spend what it takes, including their lives, to do us harm. Us, Americans. Any of us. All of us.

For a country with millions of people walking around with a cell phone to

their ears, we're pathetically vulnerable to our communications systems being clobbered.

So, as I've been writing, it's payback time for us ham operators. We've finally got the opportunity to be worth the billions of dollars in choice frequencies we've been allocated by forming a national emergency response system, with cells in every town in the country. Cells set up and working on a daily basis.

## Most Likely

Hijacking the airliners surprised us, but only because we were fast asleep, and so was our \$30-billion-a-year national security staff. We ignored the alarm bell that went off a couple years ago when hijackers grabbed an Air France plane with the intention of using it to destroy the Eiffel Tower. A French security SWAT team killed the hijackers before they could take off.

Now that we've been rudely shaken awake it's going to be a lot tougher for the enemy to use our airliners as missiles. And that means the terrorist groups are going to do something else — the most likely being a germ warfare attack on several cities, all at once. I don't think Duncan Long was making it all up in his book, *Bioterrorism*, when he said that Saddam Hussein has over a thousand sleeper Iraqis here, preparing to dump tons of anthrax on us with the goal of killing about 200 million Americans in a week.

You aren't going to be providing any emergency communications if you're dead, so how can you improve the odds of your (and your family's) personal survival?

Well, how about getting gas masks and Tyvek protective suits? Two things. First, on September 12th every gas mask supplier in the country was cleaned out. Ditto protective suits. Masks went from \$17 to \$75, then to \$200. Okay, maybe when they get a new shipment, right? Wrong. The gas masks have mainly been Israeli army surplus. Israel is now trying to provide masks for their population and I understand they are 600,000 behind for them, so it's going to be a long time before there are any new gas masks arriving.

Unless you're going to go around wearing a mask 24/7, you'll probably be up to here in anthrax spores before you know it.

Does that mean we're all sitting ducks? Of course not. But, presuming that our inept national security forces are unable

*Continued on page 64*



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait! I'll see some of the gems you've missed reading. You'll have plenty of fascinating snuff to talk about on the air. \$5 (#02)

**The Bioelectrifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about

the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

**Wayne's Caribbean Adventures:** My super budget travel stories — where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Cold Fusion Journal:** They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

**Julian Schwinger:** A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

**Dowsing.** Yes, dowsing really does work. I explain how and why it works, opening a huge new area for scientific research with profound effects for humanity. \$2 (#84)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. I explain the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts — like Hapgood, Einstein, Snow, Noone, Felix, Striber. \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with readers who worked for

NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait! You hear some of Gotschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UL, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 Editorials:** 120 pages, 100 choice editorials. \$10 (#72)

**1997 Editorials:** 148 fun-packed pages. 216 editorials. \$10 (#74)

**1998 Editorials:** 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)

**1999 Editorials:** 132 pages of ideas, book reviews, health, education, and

anything else I think you ought to know about. \$10 (#76)

**2000 Editorials:** 76 pages (thinner magazine as a result of our slowly dying hobby) \$5 (#77)

**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Silver Colloid Reprint.** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98)

**Colloid Kit.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)

**Wayne's Bell Saver Kit.** The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

**Cold Fusion Six-Pack:** Six Cold Fusion Journal back issues to bring you up to speed. \$20 (#19)

**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs — such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$35 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon you wondered at their weird gait. Wait! You see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of giveaways that the photos and films had to have been faked. \$46 (#93)

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The 73 Flea Market, Barter 'n' Buy, costs you peanuts (almost) — comes to 35 cents a word for individual (noncommercial) ads and \$1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

**Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the May 2002 classified ad section is March 10, 2002.**

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
## NEHEN SAY DIE

*continued from page 62*

to frustrate Saddam's or Osama bin Laden's terrorist cells, which seems likely, we're going to get hit.

## The Answer

Back during WWI, when flu killed twenty million people — or earlier, when the Black Plague wiped out millions, and so on, there were always a few people who either didn't get sick at all, or quickly recovered. Miracles? No, just people with strong immune systems. But if you are busy putting poisons into your body and ridiculously mistreating it, your immune system won't even be able to fight off something as mild as a cold. I've been over the details too many times. If you've missed all that, you can get the full treatment in my \$10 *Secret Guide to Health*.

The basics are simple: Stop poisoning your body and give it the food and water it was designed — over a million or so years — to use for fuel. 



# 73 Amateur Radio Today

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**Taming the  
Wild Junk Box**

**Easy-Build  
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• AC Line Filter**

**Remembering:  
• *Titanic*  
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**Maldives  
Adventure**

**Window  
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For Your  
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## QRX . . .

### Yikes! It's Another RECOUNT!

Unfortunately, some dark news now follows the good news on ham radio growth patterns recently reported. Now it seems that the numbers may not be as good as thought.

Fred Maia W5YI, who follows growth trends in ham radio, says that the numbers were overly optimistic:

"The FCC database is a database of all amateurs who have been licensed for 12 years. That's ten years for the license term and an additional two. The reason it stays in the database for the additional two is so that

it can be renewed during the grace period. Therefore, the licenses in the database are two years more than the ten-year term, or twenty percent inflated."

According to Fred, as of January 15, 2002, there were actually only 98,030 holders of the Extra class license; 86,425 legacy Advanced; 138,546 Generals; 318,603 Technicians and legacy Tech-plus; and only 39,972 Novice class. The total is 681,576. That is considerably lower than the 720,194 reported in the latest QRZ census and 10,424 lower than the adjusted 692,000 that others believed to be accurate.

The bottom line: Once you take away the expired

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article [IBM (ok) or Mac (preferred) formats], carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

## NEVER SAY DIE

Wayne Green W2NSD/1

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### Action!

We've got a problem and we damned well better do something about it! What's the problem? Our hobby is heading toward extinction ... and we *aren't* doing anything about it. And by "we" I mean *you*, as well as your very distinguished ARRL HQ gang and the Board of Directors.

With about 80% of our licensees inactive and newcomers down to a dribble, our future right now looks bleak.

But gee, I hear you mumbling, what can I do about something like that? What you can do is get your big fat bew-tox into gear. Yes, of course I have a plan, and I think you'll like it.

Okay, problem #1: We need to get kids interested in ham radio. We need new blood, and a lot of it. Now, how are we going to do that? That's easy, we're going to start promoting the fun and excitement amateur radio provides. We're going to get visible. As long as kids don't even know the hobby exists, we aren't going to be able to infect them with hamitis. That's the affliction I caught when I was 15 and have never been able to shake off.

Yes, I know all about the Internet and kids. But kids have always had a lot of interesting options.

We need to turn every ham club in the country into a propaganda mill promoting the hobby.

Before you roll over, yawning, for a little nap, let me explain why this is important. No matter how much isolationists want to cut America

off from the rest of the world, developing communications and transportation technologies are going to make this a one world society in the long run. And this means that if we're going to maintain our standard of living, our workforce is going to have to be competitive.

If we're going to be successful, we're going to have to have the best-educated workers in the world. Right now we sure don't. We've been coasting along on our past, watching one industry after another slip offshore. We're seeing the blue-collar jobs moving to Mexico, China, and other lower-wage countries.

So where does ham radio fit into this? It's a great way to get kids interested in learning about technology. We need to get them aboard and then get them interested in learning about our ham satellites, packet, and our other pioneering activities. We don't need more shoe salesmen, we need engineers and technicians to design, build, sell, install, and service high-tech (high profit) gear.

### Step by Step

Let's start by building our propaganda barrage. Now I'm talking to you! I've had an almost endless number of exciting and fun adventures involving the hobby ... and I write about them in my essays. How about *you*? When are you going to sit down at your word processor and tell me about a ham-related adventure you've had? I'd love to be able to run a section of

the magazine with these stories. And then reprint them in a booklet ham clubs can use to give to prospective hams. A booklet just about my adventures isn't going to do the job ... even though I could fill a whole book with them.

Dubya at the Korean DMZ reminded me of when I visited there and got on the air for a few hours with one foot in each of the Koreas, talking with friends all around the world. What a kick that was!

What are some of the fun things you've done with the hobby? Tell me about them.

Once we have some solid propaganda to lay on the kids, we have to reach them. That's not as hard as you probably think. The idea of being able to keep in touch with friends via a local repeater will get them excited. That's better than their cell phones. Being able to talk with people anywhere in the world is another big plus.

My many 20m contacts with Robbie 5Z4ERR in Nairobi got me to organize a ham hunting safari, not one minute of which will I ever forget.

Sure, I've done my share of totally forgettable 75m round tables. I've made thousands of "the rig here is" short contacts. Most of the 350 or so countries I've confirmed were contacts that lasted less than a minute. Done all that. They're not what stands out for me. My OSCAR contact with Moscow, where we had a 20-second window ... that stands out. My sitting up all night operating with King Hussein. My *nwo* DXpeditions to Navassa. The contest when I worked a

hundred countries in one weekend. The night I worked all 50 states on 75m ... just to see if I could do it.

Sorry, but the stories of my exciting ham adventures can go on for hours. What I need are yours, not mine.

If you haven't had any exciting ham adventures, maybe it's time to get unstuck and have some. The opportunities are there, just grab them.

Have you sent any rigs up in balloons? Rockets? Operated from some weird place? Helped in an emergency? Have you operated from a hot air balloon? Have I told you recently about the time I did that while ballooning over the South African veldt? Or, in the early repeater days, when I made 2m contacts while flying across the country on commercial airlines? Yes, with the permission of the pilot.

### A More Immediate Problem

If you've been watching *60 Minutes* and other programs of its ilk, you know that thousands of terrorists have infiltrated our country, all awaiting orders on how to do big-time harm. They've been taking flying lessons, scoping out the crop duster planes, obviously with the goal of spreading something we really don't want spread. I somehow doubt that they've been doing this just to make us nervous.

What that means is that there's a good chance our ability to set up emergency

*Continued on page 7*



continued from page 1

licenses that are in their grace renewal period, the club and military recreation stations and the like. The numbers are not nearly as rosy as people thought.

Thanks to Newsline. Bill Pasternak WA6ITF, editor.

## Would That Be Dubya 4?

President George W. Bush has taken to the ham radio airwaves. This, to thank the Florida Amateur Radio community for being ready to serve the public when it is needed.

The president's comments were made during a stopover the morning of January 31st at the Volusia County Fire Services and Training Center near Daytona. Around 9:15 a.m. Eastern Time, President Bush checked in to the Northern Florida Amateur Radio Emergency Service Net on 3.950 MHz, using a portable station set up by John Schmidt AF4PU. Then the president made these remarks to the 40 or so stations listening to the net:

"I want to thank all the volunteers who help make sure that Florida is prepared for any kind of emergency. I also want to assure you that your federal government is doing everything we can to make sure that there is not an emergency — starting with unleashing the mighty U.S. military overseas to bring evil ones to justice. But should there be a need for a response, I want to thank you all for helping our communities be prepared. And finally, I want to tell you — we are lucky to be Americans and may God continue to bless this great land of ours. Thank you very much."

Needless to say, the net members were delighted to have the president of the United States address them. More important, hams nationwide can now be sure that President Bush knows that amateur radio operators are ready to serve whenever he, and the nation, needs to call on them for help.

Thanks to Bill Burnett KT4SB, via Newsline. Bill Pasternak WA6ITF, editor.

## The ABCs of Friendship

A friend ...

- (A)ccepts you as you are.
- (B)elieves in "you."
- (C)alls you just to say "Hi."
- (D)oesn't give up on you.
- (E)nvions the whole of you (even the unfinished parts).
- (F)orgives your mistakes.
- (G)ives unconditionally.
- (H)elps you.
- (I)nvites you over.
- (J)ust wants to "be" with you.
- (K)eeps you close at heart.
- (L)oves you for who you are.

- (M)akes a difference in your life.
- (N)ever judges.
- (O)ffers support.
- (P)icks you up.
- (Q)uiets your fears.
- (R)aises your spirits.
- (S)ays nice things about you.
- (T)ells you the truth when you need to hear it.
- (U)nderstands you.
- (V)alues you.
- (W)alks beside you.
- (X)plains things you don't understand.
- (Y)ells when you won't listen, and
- (Z)aps you back to reality.

Thanks to the Warrensburg (MO) Area ARC's The Repeater, June 13, 1998.

## New Element Discovered

The heaviest element known to science was recently discovered by government research physicists. The element, tentatively named Administratium, has no protons or electrons and thus has an atomic number of 0 (zero). However, it does have one neutron, 125 assistant neutrons, 75 vice neutrons, and 111 assistant vice neutrons. This gives it an atomic number of 312. These 312 particles are held together by a force that involves the continuous exchange of meson-like particles called morons.

Since it has no electrons, Administratium is inert. However, it can be detected chemically as it impedes every reaction that it comes in contact with. According to the discoverers, a minute amount of Administratium caused one reaction to take over four days to complete when it would have normally occurred in less than one second. Administratium has a normal half-life of approximately three years, at which time it does not actually decay but instead undergoes a re-organization in which assistant neutrons, vice neutrons, and assistant vice neutrons exchange places. Some studies have shown that the atomic mass actually increases after each reorganization.

Research at other laboratories indicates that Administratium occurs naturally in the atmosphere. It tends to concentrate at certain points such as government agencies, large corporations, and universities, and can usually be found in the newest, best appointed, and best maintained buildings.

Scientists point out that Administratium is known to be toxic at any detectable level of concentration and can easily destroy any productive reaction where it is allowed to accumulate. Attempts are being made to determine how Administratium can be controlled to prevent irreversible damage, but results to date are not promising.

Thanks to the July-August 1999 edition of the Static, the newsletter of the Straits Area ARC, Dick Esterline KG8JK, editor, via the September 1999 ARNS Bulletin.

## But Does He Have His Lunch?

According to news reports, Carol Dukes spent the equivalent of \$220 in United States currency on planes and taxis in a dash from her home in Berkshire to London's Heathrow Airport and on to Scotland — to catch her 11-year-old son Charlie after she realized he had left his GameBoy handheld computer game at home.

Charlie Dukes was on a school field trip. Carol Dukes caught up with her son's train at the Dumbarton station near Glasgow. She says that she is not an overindulgent mother, but did feel responsible for repacking Charlie's bag and forgetting to replace the game and his pencil case.

Ironically, Charlie Dukes and his 39 classmates were bound for the isolated island of Iona. The reason for the trip was to learn about life without any modern comforts or communications devices.

To which we must ask, Would a ham radio mom do the same thing if her child went off on a trip and left his or her HT behind?

Thanks to Jeramy Boot G4NJH, via Newsline. Bill Pasternak WA6ITF, editor.

## Whose Job Is It?

This is a story about four people named Everybody, Somebody, Anybody, and Nobody.

There was an important job to be done, and Everybody was sure Somebody could have done it, but Nobody did it.

Somebody got angry about that because it was Everybody's job. Everybody thought Anybody could do it, but Nobody realized that Everybody wouldn't do it. So it ended up that Everybody blamed Somebody when Nobody did what Anybody could have done.

By the way, what's your name?

Thanks to The Modulator, the news and views of the Fort Myers (FL) ARC, Inc., Oct. 2001.

## QCWA Scholarships

The Quarter Century Wireless Association has announced that it is funding several scholarships for 2002. There are eleven QCWA scholarships valued at \$1,000 each and five valued at \$1,500 each to be awarded later this year. Hams interested in applying for the QCWA Scholarships should contact the Foundation for Amateur Radio. The Foundation administers the scholarships sponsored by the QCWA. Additional information and an application form may be requested by letter or QSL card to the FAR Scholarships, Post Office Box 831, Riverdale MD 20738.

Thanks to QCWA, via Newsline, Bill Pasternak WA6ITF, editor.



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## NEVER SAY DIE

continued from page 4

communications will be needed. What we don't need is to wait until we're faced with an emergency before we have our emergency systems ready to go and thoroughly tested.

When they start spreading anthrax, we're either going to want to know where to get a vaccine or else have our immune systems so strong that it isn't going to affect us. And it sure won't hurt to have a few gallons of silver colloid on hand. Once the terrorists strike, our doctors and nurses are going to be just as sick (or, more likely, dead) as everyone else, so you won't have to worry about sitting in a waiting room, waiting for a prescription for a vaccine.

Of course the best approach is to do as the terrorists hope and just wait to see what, if anything actually happens. And then panic. This war is going to be fought right here in America, and you've been drafted.

## The Propaganda Barrage

There are thousands of radio and TV talk shows, all looking for interesting people to interview. Get interviewed.

Send news releases to every neighborhood paper announcing club meetings and activities. Make a big deal out of your speaker and his subject. This is your opportunity to let the public know about ham satellites, packet radio, DXpeditions, slow scan, your club's emergency preparations, repeaters, ham contests, and so on.

I want my mail to be stuffed with copies of ham newspaper clippings.

I want to see stories in the club newsletters about getting our 80% inactive hams activated. Call them up and invite them to a club meeting. Be sure to have a good speaker booked. We're going to need all 600,000 licensed hams pitching in.

Now, get busy with your word processor and give me some ammunition.

## Senate Hearing

The other day they replayed a tape from the 1987 Iran-Contra hearings.

Continued on page 48

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# LETTERS

## From the Ham Shack

**Somewhere in Afghanistan.** Hi, Wayne: It will probably be April 1 by the time you get this, but I hope it will be worthwhile nonetheless. I cannot give you my name or address or anything, and indeed I have asked someone to carry the enclosed out of the country for me in case there was any problem with censors. But I don't feel there is anything unpatriotic in doing so, because I also don't think there is any military value in this, and plus I have told my superiors about it anyway.

So here is what happened: I was involved in the searches of the caves in Tora Bora. There was unbelievable stuff there, as you saw on CNN and we saw in person. Only obviously we saw much more than you.

But let me give you a little background first. I grew up in southern California, where I was into, in order, hot girls, hot cars, and — of all things — ham radio. This was because my dad is a ham, as well as a 73 subscriber. So I used to follow most of all the two Bills — one was the guy who wrote the Looking West column about all the repeater wars in our area, and the other was the old marine (K1CLL maybe?) who used to write

up these McGuyver-type projects where you could make a transceiver out of a toaster, or at least it seemed like it. So eventually I got my ticket and have been a fan (and reader) of 73 ever since.

Back to the caves: We went into this one huge cavern that looked like a giant office. The lights were even still on, and some of the computers were even still turned on, so we must have been really close. But there was about six inches of paperwork trash all over the floor. We were really, and I do mean really, afraid of booby traps there, but I guess they didn't have time for them.

I would say that I was probably the fifth or sixth person into the room, and once it was "cleared," we started looking for anything of use — names, photos, manuals, etc. — in the trash on the floor.

Suddenly, something caught my eye and set off a mental alert that I had seen it before — it was a photo torn out of an issue of 73!

As I looked at it, I remembered that it came from one of your reports about the mysterious Ishmod over the years [April

1984, April 1985, May 1999, April 2000 — ed.]. And the more I thought about it, the more I recalled that the stories included things about "camps" and "mysterious glows" and electrical engineering and even the civil unrest in Indonesia. Now, this!

Over in the corner of this room, up on pallets and still plugged in (some sort of generator system, obviously, but we couldn't hear anything), was one of these clunky old Xerox copiers that uses powder for a toner (and I'm here to tell ya that we get pretty itchy around black powder of ANY sort!). I was able to get to it before they started to remove the rollers to look for impressions, etc., and I made this one copy of the photo, which I send to you. As I said, I turned over the original, with explanation, in my report.

What do you think of this? Note the arrow newly drawn in. Does Ishmod really live?

P.S. Rx cx really great up here, if you know what I mean.

Submitted anonymously



It is the  
and its im  
mankind  
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the April, 19  
Eds.

The rocks c  
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Chatrapur on



William Rynone, Ph.D., P.E.  
President  
Rynone Engineering, Inc.  
P.O. Box 4445  
Annapolis MD 21403

# Ham Window Dressing

*If this nifty car frequency display doesn't draw gawks, nothing ever will.*

*Ever have the desire to let other hams who were sporting com antennas on their cars know a contact frequency? The following description of hardware for a rear window display will enable you to construct an easy-to-read suggested contact-frequency display system.*

**T**his system design and construction was developed by two of the Anne Arundel (Anne Arundel County, Maryland) Radio Club members upon request by another radio amateur. Some design criteria were: easy to read from a distance, low

cost, simple construction, easy to change display, and easy to install.

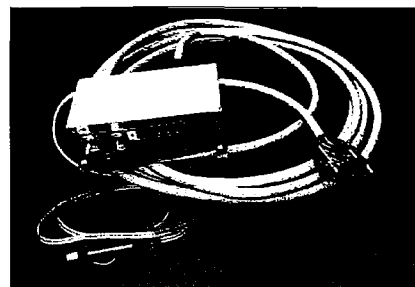
## Design considerations

LCDs of the size desired (several inches tall) are very expensive compared with LEDs. Also, LCDs require

back-lighting during darkness. Instead of purchasing complete bar segment displays, separately mounted LEDs were used. The display selected was a 5 x 7 dot matrix of jumbo LEDs. Red LEDs were selected due to cost and brightness considerations. To minimize complexity and maximize display brightness, DC currents were used rather than strobing the display. To minimize the number of wires connecting the control panel at the dashboard to the display in the rear window, BCD switches and 7447 BCD-to-"N" of 7 drivers were used.



**Photo A.** Rear window display during daylight hours. Regulations regarding the placement of signs on vehicles vary from state to state. They may also vary with the type of vehicle (e.g., car, van, or truck), the location of the sign on the vehicle (e.g., rear deck, trunk, or side window) and the size or type of display (illuminated or passive). Contact your local motor vehicle office.



**Photo B.** A view of the control box with an 8-ft.-long 25-wire data cable. The cable is terminated with a DB-25 female connector. A 3-ft. power cable is also shown connected to the control box. This cable is terminated with a cigarette lighter plug.



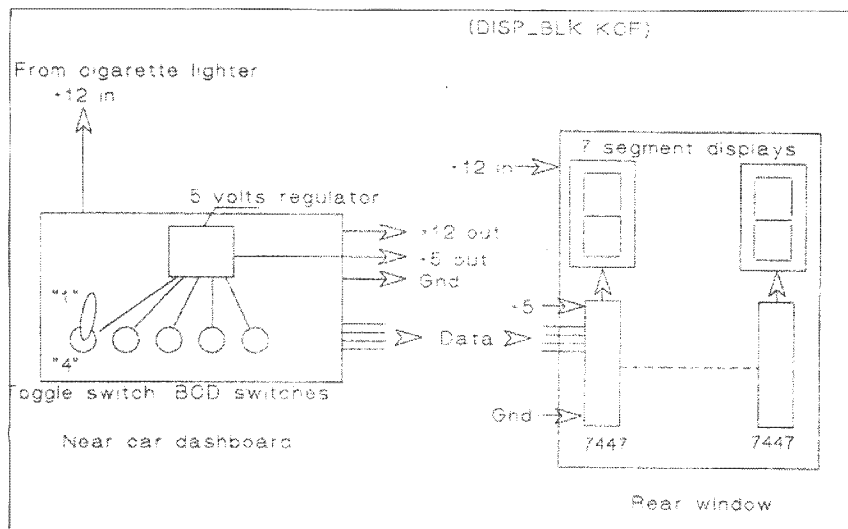


Fig. 1. System block diagram.

7447 drivers are ubiquitous and low-cost (\$1.29 each by mail order). Segment drive currents of 20 mA at a car electrical voltage of 12 volts was decided upon. At 13.8 volts, the current for a bar segment consisting of 3 LEDs increased to 26 mA and the 4-LEDs-per-segment current increased to 28 mA. Since the jumbo LEDs were purchased from a surplus electronic parts supplier, data sheets were unavailable. There was concern about exceeding the maximum current rating of the LEDs; however, over 100 hours of "burn-in" have occurred with no failures. By employing BCD switches rather than 10-position rotary switches, the total

number of wires between the control panel and display were reduced from 45 to 21. To minimize voltage drops, the +12, +5, and ground lines were "doubled up."

#### System block diagram

The control box consists of a 5 volt regulator (7805), four BCD switches, an SPDT toggle switch, an SPST toggle switch, a cigarette lighter plug with a built-in 2 amp fuse, a green LED assembly with built-in resistor, a female DB-25 connector, and an aluminum enclosure.

Continued on page 12

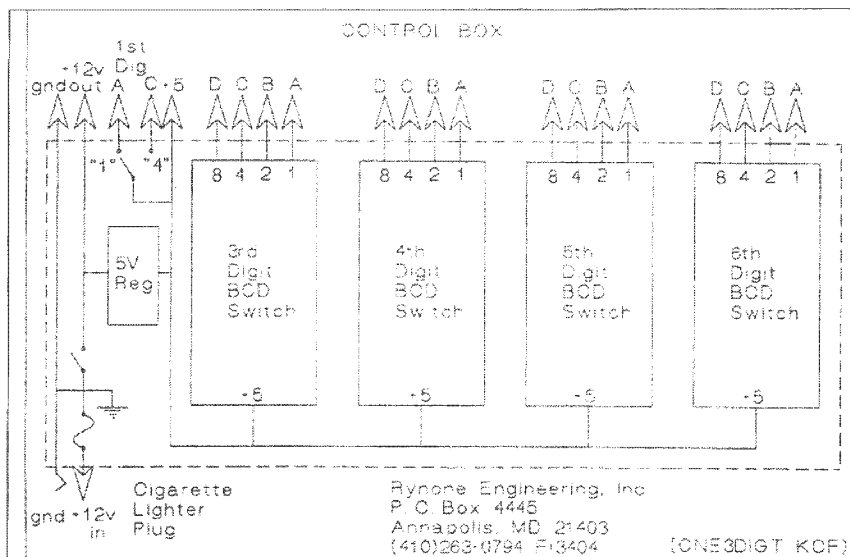


Fig. 2. Control box schematic.

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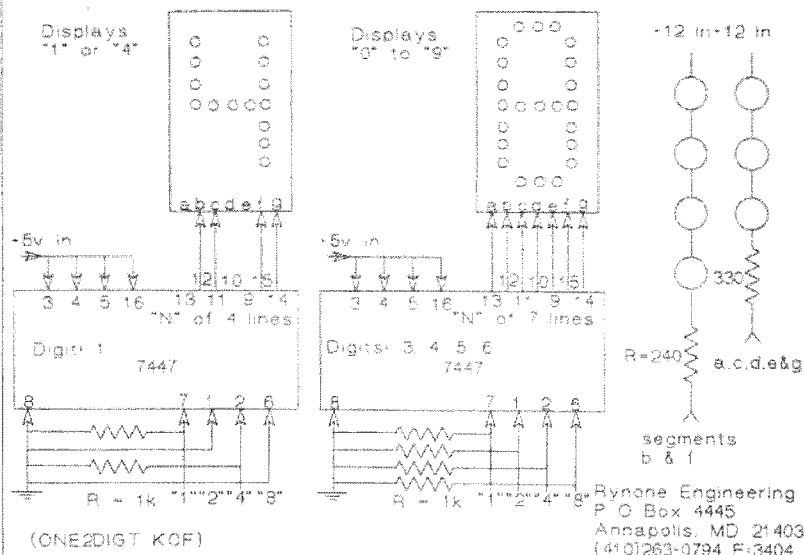


Fig. 3. Display schematic.

## Ham Window Dressing

continued from page 11

### Control box schematic

The display assembly consists of six decimal digits. Four of the digits are composed of seven-segment displays. The second digit is simply the decimal number "four." This digit is hard-wired as shown. The first digit of the system must display either decimal "1" or decimal "4" (for two meter or 440 MHz) — thus only four segments (b, c, f, and g) are required. Selection of either "1" or "4" is made via a single pole double throw toggle switch.

For the remaining four digits, BCD switches are used and the four output

terminals are connected to wires that interconnect the control box switches to the 7447 decoder/drivers. The output of each 7447 consists of a LOW logic level for "N" of 7 segments. The second digit is always displayed as a "4." Consequently, segments b, c, f, and g are hard-wired to +12 volts with the appropriate current limiting resistors (330 ohms for c & g, 240 ohms for b & f). It is worth noting that should it be desired to construct a display where all six digits are selectable, all that is required is to replace the SPDT switch-selected first digit and hard-wired second digit with two additional decoder/driver boards.

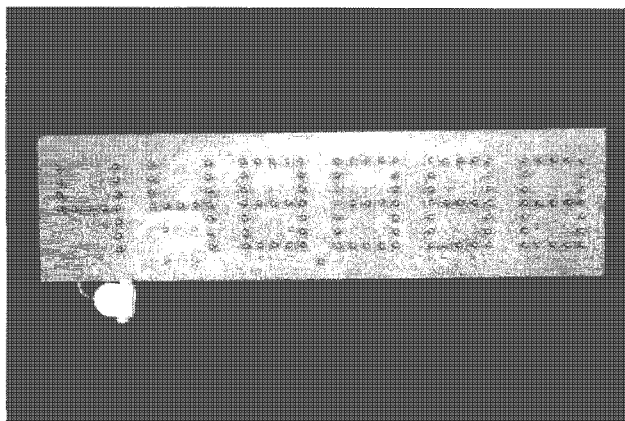


Photo C. Close-up front view of the display panel with a 6-in.-long, 25-wire data cable, and its terminating DB-25 male connector.

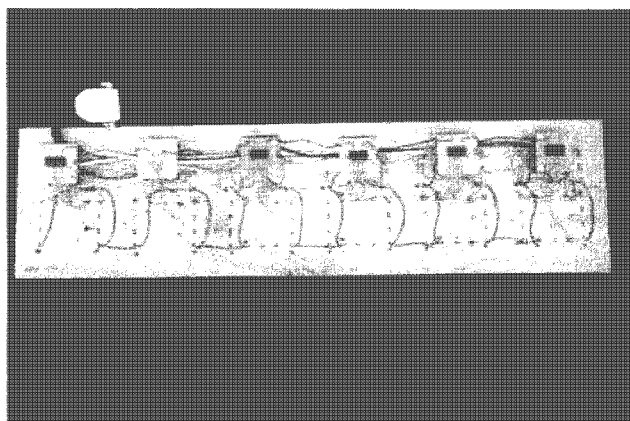


Photo D. Rear view of the display panel showing the wiring between the data cable and each of the display digits.



## Installation

By employing a cigarette lighter plug, the display system may be easily removed from the car. This feature may be desirable where auto theft is of concern. The data cable may be buried underneath the front seat and then under the rear carpet and finally under the rear seat. For ease of removal, it may be desirable to not locate the cable under the rear seat and instead locate the cable on the side of the rear seat up to the rear deck. Also, plugs and jacks may be included at the cable entrance to the control box and also at the rear display. This would enable easy removal of the display

and control box and leave the cable assembly in place.

## PCBs

Printed circuit boards are available for each digit of the 6-digit frequency display system at \$6 per board, plus \$1.50 S&H per 2 boards. You can purchase the set of all six boards for \$30 plus \$3 S&H. Inquiries should be addressed to FAR Circuits, 18 North 640 Field Court, Dundee IL 60118. Phone 847-836-9148, or E-mail [farcir@ais.net].

## Acknowledgments

Mr. Oscar Ramsey did quality con-

struction and testing. Dick Wilkinson used his Nikon to take professional-quality photos. Professors (ret.) Ralph Santoro and Steve Burns kindly provided technical assistance. **Z3**

Qty.	Item	Part No.	Distributor
<b>Control Box:</b>			
4	BCD switches	136557	Jameco
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1	5 volt regulator, 7805	276-1770A	Radio Shack
1	Aluminum project box	270-238	Radio Shack
1	Cigarette lighter plug w/ fuse	274-335	Radio Shack
1	Green 12 V LED cartridge	276-085A	Radio Shack
1	Connector, DB-25, female	276-1548	Radio Shack
1	Power cable, 2-wire, #16 wire in plastic sheath		
1	Fuse, 2 A, 3 AG	270-1007	Radio Shack
<b>Display Assembly:</b>			
5	7447 decoder/drivers	50420	Jameco Electronics
121	LEDs, 8mm jumbo, red	LED-23	All Electronics
1	Plastic sheet, 4 in. x 21 in. x 1/8 in.		
10	Resistors, 240Ω, 1/2 W	N/A	Mark Electronics
22"	Resistors, 330Ω 1/2 W	271-1315	Radio Shack
18"	Resistors, 1kΩ, 1/2 W	271-1321	Radio Shack
6	Perboards	276-148	Radio Shack
1	Connector, DB-25, male	276-1547	Radio Shack
<b>Interconnect Cable:</b>			
1	Cable, 20-wire, in a plastic sheath or ribbon, #22 wire		
1	Connector, DB-25, male	276-1547	Radio Shack
1	Connector, DB-25, female	276-1548	Radio Shack
Cable note: All the above for cable, OR			
1	Computer cable, 15 ft. long w/ DB-25 male and female connectors	177279	Jameco
*Note: These items sold in blister packs of more than one item per package.			

Table 1. Parts list.

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# SOS ... SOS ... *Titanic!*

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*In 1910, the government required all ships to have a wireless telegraph. Yet by 1912, fewer than 400 ships were equipped with Marconi wireless. It was the Titanic disaster, just off the coast of St. John's, Newfoundland, which finally proved the value of wireless to the world. This article is about the Titanic's fateful day and the two wireless operators, John Phillips and Harold Bride, who performed their duties with valor and honor. We reprint it to honor the 90th anniversary of the disaster.*

Working on the *Titanic* was serious business and hard work for senior telegraphist John George Phillips, 24, and junior telegraphist Harold Sidney Bride, 22. Although signed on with the crew as telegraphists, the two men were actually employees of Marconi International Marine Communications Company, Ltd. Ship-to-shore wireless transmission was in its infancy and viewed more as a convenience than an integral part of the ship's command. The operators were under the captain's command, but only with regard to receiving and transmitting messages of importance to the ship. Their main job was taking care of the passengers' telegrams while at sea. The ship's weather reports and ship-to-ship telegrams came second, as they weren't paying customers. Under its agreement with the Marconi Company, the White Star Line, owner of the *Titanic*, was provided with free wireless messages between the ship and its owners or other ships regarding navigation, safety, or the ship's business, provided the messages did not exceed

a 30-words-per-day average. Excess words were charged to the ship's owner at half the usual tariff rates. In return, White Star was to provide the Marconi operators with their meals and lodging. The Marconi Company, in turn, paid John Phillips and Harold Bride approximately \$23 per month and \$12 per month, respectively.

## **The fateful Sunday**

On Sunday, 14 April, 1912, Phillips and Bride had been busy receiving, logging, and transmitting passenger messages. Wireless transmitting and receiving ranges increased markedly at night, and night signals from the powerful British land station at Poldhu (call letters MPD) relayed by intermediate ships had included news, stock reports, and some personal messages. There had been daily traffic messages to and from *Titanic's* passengers. The ship's 1.5-kilowatt wireless transmitter, among the most powerful afloat, had a 400-mile daytime transmitting range. This range increased significantly at night, but during the day, particularly now in the North Atlantic, its functions were limited to ship-to-ship messages.

Signals were transmitted and received on closely adjacent standard frequencies, with two, three, or even more signals being sent or received at the same time. Much of the operator's skill involved being able to discriminate and select the particular messages addressed to his station. To assist operators, each station had its particular identifying call letters. With few exceptions, call letters from British ships generally began with M, while those of German ships started with D, and United States naval vessels with N. *Titanic's* call letters were MGY.

The long hours and tedious work made the job very stressful for Phillips and Bride, but fortunately for them they would work in shifts to help each other at the Morse key. In 1912, laws did not require two operators or 24-hour watches on the ship's wireless. Many passenger liners and all freighters had single wireless operators who rested or slept when they could.

## **Ice!**

Wireless operators were supposed to intercept for their captain's attention all messages relating to the navigation and safety of his vessel. Phillips and



Bride received several messages concerning ice conditions in an area toward which the *Titanic* was directly heading. At 9:00 a.m., a message from the *Caronia* was taken immediately to the bridge, where it was posted for the officers' attention. Another message was received from *Athinai* via the *Baltic*:

*Captain Smith, Titanic*

*Greek steamer Athinai reports passing icebergs and large flotation of ice field today.*

This message placed icebergs within a few miles of *Titanic*'s track. It was taken to Captain Smith. The message was not posted on the bridge nor entered in the scrap log until 7:15 p.m.

As daylight turned to dark, the cool air began to turn cold. At 7:00 p.m., it was 43 degrees. Because of the day's wireless messages, an iceberg watch was ordered. By 7:30 p.m., atmospheric temperature had dropped to 39 degrees.

At this time a message from the *Californian* to the eastbound freighter *Antillian* was overheard by the *Titanic*'s wireless operators. Harold Bride delivered the message to the bridge and handed it to an officer. The *Californian* message reported ice about 18 miles north of *Titanic*'s track. By 8:40 p.m., the air had fallen to 35 degrees as the *Titanic* steamed full ahead at 21 knots. Around 8:50 p.m., Captain Smith was briefed by his officers about weather conditions and the ice and about the precautions that had already been taken.

#### More warning

It was 9:40 p.m., and in the wireless shack Harold Bride had turned in for a nap before working the busy late-night traffic. John Phillips was manning the transmitter alone when a message was received from the westbound *Mesaba*:

*To Titanic and eastbound ships:  
Ice reports. Saw much heavy pack ice and great number large icebergs.*

*Also field ice. Weather good, clear.*

The land station at Cape Race, Newfoundland (call letters MCE), was in range now and John Phillips was very busy transmitting messages which had accumulated during the day. Unable or unwilling to leave his key unattended, he ignored the *Mesaba*'s ice message which described ice directly ahead for *Titanic*.

The message never did get to the bridge. With lights from the ship's decks seemingly guiding the way, *Titanic* sped with determination through the night at 21 knots. The sea was so calm that one officer on the bridge made the comment that in all his years on the sea he had never seen it so flat. The stars shone brightly in the moonless sky.

As 10:30 p.m. approached, the steamer *Rappahannock*, passing on an opposite course, signaled the *Titanic* with its Morse lamp:

*Continued on page 16*

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## SOS ... SOS ... *Titanic!*

*continued from page 15*

*Have just passed through heavy field ice and several icebergs.*

*Titanic replied by signal light:*

*Message received. Thanks. Good night.*

*Titanic* continued on her course, speed undiminished. In the wireless room, John Phillips was very busy with Cape Race traffic as well as sending and receiving messages to and from other ships. A few minutes before 11:00 p.m. he was interrupted by a very strong signal from a nearby ship, the freighter *Californian*, twenty or so miles away to the north:

*I say old man we're stopped and surrounded by ice.*

She was so close that she almost blasted Phillips' ears off. Annoyed by the intrusion interrupting his traffic, John Phillips curtly responded:

*Shut up. Shut up. I am busy. I am working Cape Race.*

*Californian's* wireless operator, Cyril Evans, rebuffed by John Phillips' curt message, listened for several more minutes to Cape Race traffic. Then, around 11:30 p.m., he turned off his equipment and turned in.

### Doomed

On the *Titanic*, two crewmen in the crow's-nest swung their arms in an effort to keep warm in the freezing air. Their eyes strained into the night's darkness ahead. They had wished they had their binoculars to help them see better. Somehow, the binoculars had been misplaced the day before.

Suddenly, without a word, one of the crewmen hunched forward and peered intently into the black, moonless night. He immediately reached for the bell lanyard and gave three sharp pulls to signal an alarm. He then picked up the phone piece and called the bridge: "Iceberg right ahead."

The warning was too late. The officers in the bridge stopped and reversed engines and averted a head-on collision with a large iceberg, but the huge iceberg managed to strike a glancing blow on the *Titanic* fifteen feet above her keel. The gash extended for 300 feet along her side, flooding five of her compartments. The *Titanic* was designed to float with three or four flooded compartments, but not five. She was doomed.

### *Carpathia* to the rescue

By 12:05 a.m., the *Titanic's* front compartments were rapidly filling with water and all engines were stopped. Captain Smith, realizing the ship was sinking, personally went to the wireless room and instructed the wireless operator to order a call for assistance. "You had better get assistance," Captain Smith told his wireless operators.

John Phillips set the frequency on the multiple tuner to 600 meters, adjusted the spark gap for maximum range, and sent out the standard CQD distress call (some operators called it Come Quick, Danger) from *Titanic's* huge antenna. Later that night, Harold Bride decided to use the new distress signal, SOS, which was just coming into use. *Titanic's* wireless operators sent one of the first SOS's from a ship in distress.

### SOSSOSCQDCQD—MGY.

This was a call for help to save over 2,200 lives on a ship that only had enough lifeboats to save 1,178.

By 12:45 a.m., several ships and land stations had responded to Harold Bride's and John Phillips' distress calls. The *Carpathia* was 58 miles from the *Titanic* at the time of collision and responded immediately. *Carpathia's* captain turned his ship around and raced to the rescue.

### Opportunity lost

Although the *Carpathia* was close to the distressed *Titanic*, there was another ship that was much closer — but it never heard the *Titanic's* wireless distress calls. The wireless operator on the *Californian* had turned off his

wireless and gone to bed after John Phillips had told him not to interfere with his commercial traffic. The *Californian* could have saved the lives of all the *Titanic's* passengers if only the operator had not shut off his wireless and turned in for much-needed sleep.

### Abandon ship!

On the *Titanic*, Captain Smith ordered loading of the lifeboats with women and children first. By 1:30 a.m., *Titanic's* bow was distinctly down and she listed heavily to port. The slant of the ship's deck was becoming steeper and people were having trouble keeping their balance as they moved toward the stern. Lifeboats were being lowered into the calm sea 60 feet below the ship's deck. Although the lifeboats were capable of carrying 65 passengers, some boats were filled with fewer than 20 people.

Signs of panic began to appear. In the wireless shack, John Phillips and Harold Bride were still at their posts, their distress calls becoming increasingly desperate:

*Engine room getting flooded.*

At 1:45, another distress call:

*Engine room full up to boilers.*

### Every man for himself

By 2:05 a.m. most of the lifeboats had been lowered (except for the collapsibles) and had moved away from the *Titanic*. More than 1,500 people still remained aboard. With the boats all gone, hundreds of passengers left behind stood quietly on the upper decks. A quiet calmness set in. Captain Smith made his way to the wireless room and told John Phillips and Harold Bride that they had done their duty. Now it was every man for himself.

### Into the sea

As the ocean water filled one compartment after another, the water's weight pulled the *Titanic's* bow completely under. The great ship's immense bulk started a catastrophic arc into the star-filled sky. As the *Titanic*



upended, hundreds and hundreds of people were thrown into the sea. The water temperature of the North Atlantic was about 28 degrees Fahrenheit. As energy from the generators faltered, the last wireless signal spluttered to a halt.

At 2:20 a.m., the liner started its nearly vertical descent downward into the sea. Not yet completely under the surface, with a loud roar the sinking hull broke in two near an expansion joint and engine room shaft. The forward section of the ship began its drop to the ocean floor over two miles below, while the stern section remained afloat a few seconds more before it, too, plummeted to the bottom.

### Down with the ship

Almost immediately, the silent night was filled with the calls of floating survivors, growing in number until there was almost a continuous wailing chant. Hundreds of people cried for help as they struggled in the icy cold water. Some of the ship's 1,500 passengers managed to reach some of the lifeboats, but most did not. Long before dawn, hypothermia had claimed the lives of most of the floating survivors. The rescue ship, *Carpathia*, arrived around 4:00 a.m. and started to take on survivors from the lifeboats that held mostly women and children. Everyone was still in shock, not only from the horrendous experience they had just witnessed but also from the bitter cold that engulfed them. In all, 711 passengers survived the ordeal. Captain Smith did not survive. He went down with his ship.


### Constant duty

Of the two wireless operators on the *Titanic*, only Harold Bride survived the tragedy. Even after his subsequent rescue by the *Carpathia*, he continued to perform his duties as a wireless operator. The ship already had a wireless operator named Harold Cottam, but he had not slept for many hours and was totally exhausted. Bride had to be carried from the dispensary, where he was treated for severely frostbitten feet, to the wireless room where the exhausted

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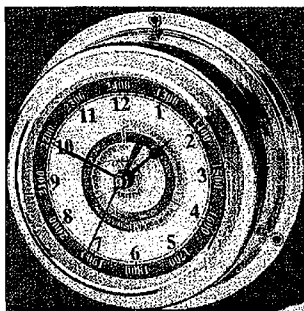
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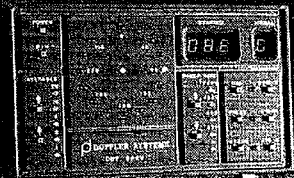
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Cottam was working. Once Bride began to transmit, Cottam got a few hours of precious sleep. Both Cottam and Bride ignored all information requests from private and public sources even as the *Carpathia* sailed full-steam to America.

Once the *Carpathia* reached New York, Bride was carried ashore on the shoulders of two *Carpathia* officers. Among the last of the survivors to be brought ashore, Bride had been almost constantly on duty since boarding the ship from an overturned collapsible boat and now, totally exhausted, he was taken to a nearby hospital for treatment of crushed and frostbitten feet.

### Inquiry

At the *Titanic* inquiry, several proposals were made:

1. Lifeboats required to have increased capacity, a seat for each person aboard, and adequate manning.
2. Wireless stations required to have 24-hour manning.
3. Amateur interference banned.
4. All ships required to provide reliable auxiliary power sources.
5. Wireless operators required to maintain secrecy of all messages.

These wireless recommendations resulted in the Radio Act of 1912, which required all ships to carry wireless stations. The Act also contributed to the Marconi Company's extraordinary financial success.

### "The last I ever saw of him ..."

The wireless operators of the *Titanic*, John G. Phillips and Harold Bride, went into the history books as two young men who heroically stood at their post, bravely transmitting distress signals until moments before the huge ship sank. John Phillips' body was never recovered. Harold Bride said of his coworker, "Phillips ran aft and that was the last I ever saw of him."

Harold Bride kept a very low profile in the years following the *Titanic* disaster. World War I found him as a wireless operator aboard the steamer *Mona's Isle*. Later in life, he became a salesman before returning to Scotland, where he died in 1956.

### Bibliography

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73

**Say you saw it in 73!**



# Does Your Junk Box Runneth Over?

*A true junkie explains how to get a grip.*

*As has been said for many years, "One man's junk is another man's treasure!" And so it goes with the unique collection of ham and electronic items that not only have status just as "stuff," but also have a personality depicting their owner.*

**J**unk being another person's treasure is the philosophy behind all swap meets. We, as hams, go to swap meets to obtain those items that we need — or at least think that we need. The driving force, of course, is that we have money burning a hole in our pocket and we hope to find something for a "bargain" price. Ask yourself

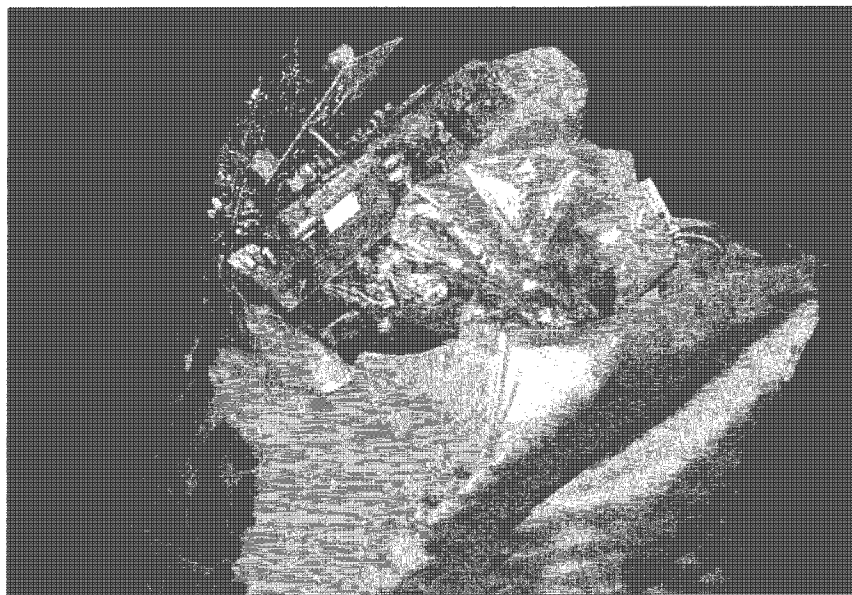
how often you've gone to a swap meet looking for a particular something. Even if you didn't find what you wanted, you most likely carried something home that you just needed to have — that's called impulse buying. Don't feel like the Lone Ranger, though, because all hams suffer from that syndrome. We're collectors of all things deemed valuable and useful.

What makes up a ham junk box? Now that's a question only you can answer, because of the uniqueness of the composition of the "junk" in your possession. My definition of "junk box" is a warehouse of parts stored for personal projects — though who knows

*Continued on page 20*

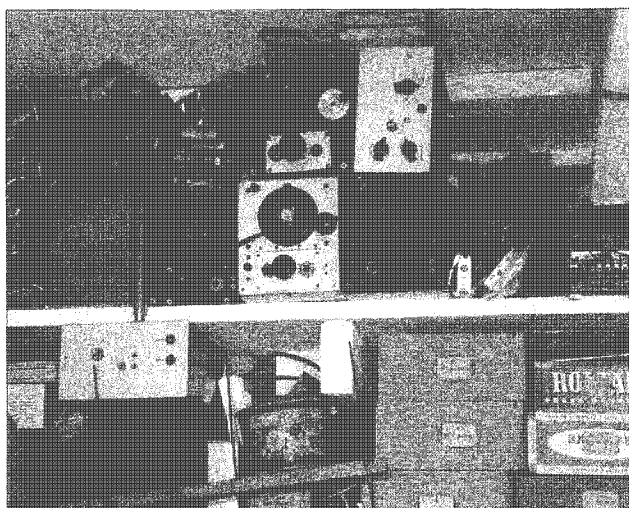
Light Bulbs				
PR-2	2.38V	500mA	15 hrs	blue bead, 2-cell flange base 7
PR-8	1.9V	600mA	10 hrs	2-cell flange
6PS-B	6.0V	140mA	800 ft-candle	—
40	6.3V	150mA	3000 hrs	E10 threaded base 8, RS 272-1128
46	6.3V	250mA	3000 hrs	blue bead, screw base
47	6.3V	150mA	3000 hrs	brown bead, bayonet base 9, RS 272-1110
48	2.0V	60mA	1000 hrs	pink bead E10 screw base
49	2.0V	60mA	1000 hrs	pink bead, bayonet
53	14.4V	120mA	1000 hrs	1CP, blue/white bead, base 9, RS 272-1117

**Table 1.** Example of a data listing for light bulbs stored in a ham's junk box.



**Photo A.** Example of parts and assemblies being stored in paper and plastic bags. Bags are filled until they overflow.





**Photo B.** Example of parts and equipment stored on shelves. A stacking technique is used to fill up available space — then jam in the next item.



**Photo C.** Labeled cigar boxes containing "junk box" parts are stacked on shelves. Having boxes two stacks deep is common practice.

## Does Your Junk Box Runneth Over?

*continued from page 19*

when a project will materialize from the stored items.

When a stranger looks into your "junk box," they usually ask, "What is it that you're going to do with all of this stuff (junk)?" What they're failing to grasp is the "value" one places on the "stuff" that's stored for future usage. Value, as used here, refers not to

financial value, but to one's understanding of the item and its usefulness in an application. Items of value can be of any size, shape, or configuration, whether in the form of components or completed devices. Electronic components are of value only to the extent that one understands their characteristics and usefulness in a project or application.

Using myself as an example, I've been collecting electronic parts since I was very young (they're still in my junk box). I understand the parts and

know how to use them in a project, should I choose to build one. From that aspect, I feel that I know the technical "value" of the part and how to apply it to an application. Does this mean that I have a use for it today? Probably not. I have some tubes that date back to the mid-1920s era that are still good and could be used in a project — but whether I will ever build something with them is the question. The answer is probably not, and knowing the technical value of those antique parts prevents me



**Photo D.** Example of a cabinet containing plastic drawers. Drawers are labeled to indicate the part within along with cursory technical data.



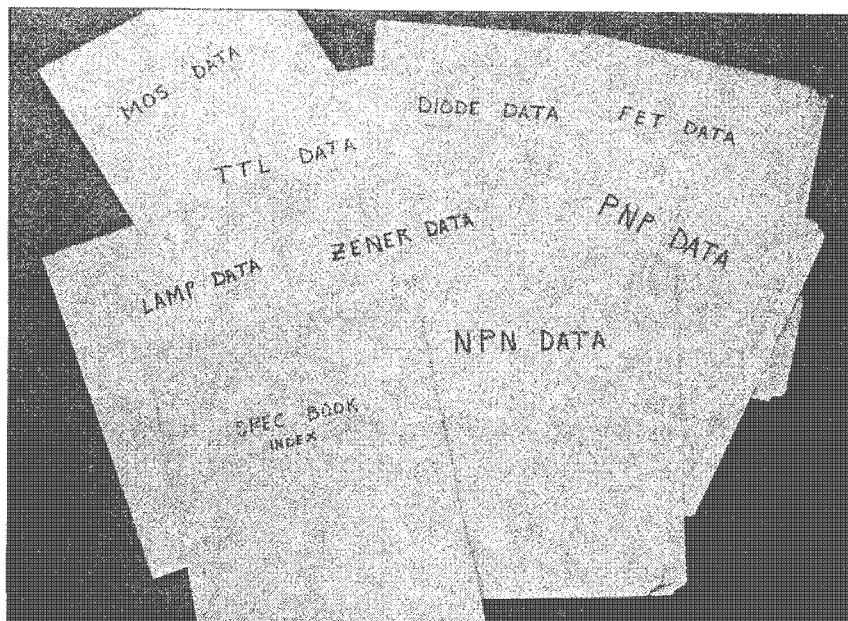


Photo E. Example of how file folders may be used for capturing part data listings. The individual listing may indicate the number of parts available in the junk box.

from disposing of them during my lifetime. True, and following my demise, my kids will probably view the "stuff" as junk and will pitch it into the trash.

If you're like me, you've built up a "junk box" of parts that are of value to you. For that reason, parts have accumulated regardless of whether there is a dedicated project in the near future for them.

## Organization

The above discussion brings up the

question of how the parts in your junk box are organized. The usefulness of your junk box is really measured by your ability to quickly find the needed item. How have you stored your spare electronic parts so that they can be retrieved when needed? Does your storage technique create the appearance as shown in **Photo A**? If so, how do you remember or know what's in the bag? With this type of organization, you have to dump out every item while searching for that one needed piece. Yes, that search and rescue operation

Continued on page 55



Photo F. Example of bound volumes of part specifications placed on a shelf for ready reference. File folders to the left contain the part data listings.

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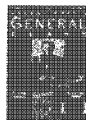
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# New Life for a Pierson KE-93

## Part 3 of 3.

*Parts one and two of this series restored the companion power supplies and part of the KE-93 receiver to an operational state. But although the receiver appeared to be ready to operate, it still failed to show signs of life.*

This final part in the series will discuss the problems that prevented normal operation and the repairs required to fix them. Following repair, the receiver was evaluated for both function and performance, with the results reported herein.

### Receiver (continued)

Correcting the dial cord problem, as discussed in part 2, was a major hurdle in preparing the receiver for normal operation. But with power applied to the receiver, it was still "dead," and the reason wasn't immediately apparent.

To begin the troubleshooting process, I removed the RF shield above the front-end tube sockets and tuner, and this allowed me to make voltage measurements on the four front-end

tubes. The voltage values measured on the plate and screen grids of tubes V3 and V4 just didn't seem to be correct, but I was momentarily unable to determine the problem. Tubed equipment gets warm after being "on" for a while, and when I touched tubes V3 and V4 to check for heat, I found them to be cold. After substituting one tube and finding that it also remained cold, I immediately concluded that it wasn't a tube problem. Yes, the heater voltage measurements at the tube sockets of tubes V3 and V4 indicated a problem, and the measured values were not as expected.

I traced the wiring for both tubes and found the ground lead tie point for tube V4 to actually be inside of the power supply — but the ground circuit

was open and the lead failed to connect to ground. The problem turned out to be a dirty contact in the connector of the power supply cable where it attached to the back of the receiver. Cleaning the connector contacts — again — resolved the problem for tube V4.

Tube V3 still didn't have heater power, and upon tracing the wiring I found a 15-ohm 2W resistor attached to a socket on the underside of the receiver chassis. Someone had cut the resistor lead with diagonals and left it hanging. Soldering the resistor lead to the socket pin resolved tube V3's problem, and the receiver began to operate.

Upon getting the receiver to operate, I worked up the voltage chart shown in Table 1 for the front-end tubes. With tubes V3 and V4 heating properly, the measured socket voltages appeared to be more logical for the circuit design.

As I began adjusting the controls to tune in stations, the noisy/dirty pots and dirty turret contacts began to "speak loudly" and cried out for help. I sprayed all of the pot resistance cards with a TV tuner cleaner and they cleaned up quickly.

TV tuner cleaner didn't seem to be appropriate for the silver-plated turret

Tube	Tube Pins (B+ = 223 V; band = 80m; max. sens.)								
	1	2	3	4	5	6	7	8	9
V1	0.07	1.24	—	—	193	75	0		
V2	—25	1.88	—	—	193	40	0		
V#	—15.5	0	—	—	115	101	—		
V4	—49	2	—	—	214	35	—		

Table 1. Chart showing the voltage values measured at the socket pins of the front-end tubes. The shield must be removed to obtain access to the socket pins.



Band	Freq. (MHz)	Sens. ( $\mu$ V)
BC	1.0	6
	1.6	1.8
160	1.7	0.25
	3.4	0.6
80	3.5	0.2
	4.0	0.15
40	7.0	0.2
	7.3	0.1
20	14.0	0.25
	14.3	0.2
15	21	0.6
	21.4	0.6
10	28	1.5
	30	0.8

Table 2. Signal sensitivity chart as a function of frequency that I measured for one KE-93 receiver.

contacts, so I wiped them with a dry paper towel and they polished up well, eliminating the contact noise.

At this point, it was obvious to me that the mechanical parts required lubrication. Applying motor oil to each moving point resolved the high friction problems. The oil was transferred to the selected points by dipping the tip end of a thin-shaft screwdriver into the oil and carrying a drop or less of oil to the point where it was needed. All excess oil was wiped up with a

paper towel. The important thing was to apply oil only to the points where mechanical friction was occurring and to keep the oil away from all of the electronic circuits.

### Operation

Once the receiver was operating without mechanical and electrical problems, it was time to do a performance check to see just how well the receiver was operating and how it compared to a modern solid-state receiver.

One of the first performance tests that I normally do is to measure a receiver's sensitivity to a weak signal. As I've said before, most receiver designs of the 1950 era exhibit a sensitivity of about 2  $\mu$ V as compared to the modern solid-state receivers that operate down to about 0.2  $\mu$ V. When measuring a receiver's input sensitivity correctly, signal-to-noise ratios are the most discriminating and meaningful. But not everyone can make such a measurement, so a comparable substitute technique is used. Yes, the comparable test is subjective, but it does provide a means for equating a receiver's performance with a numbered value. The method that I used is a minimum detectable signal level where the modulated signal remains discernible. In this case, signal-to-noise ratio sensitivity accuracy is traded for the ability to perform a "comparable

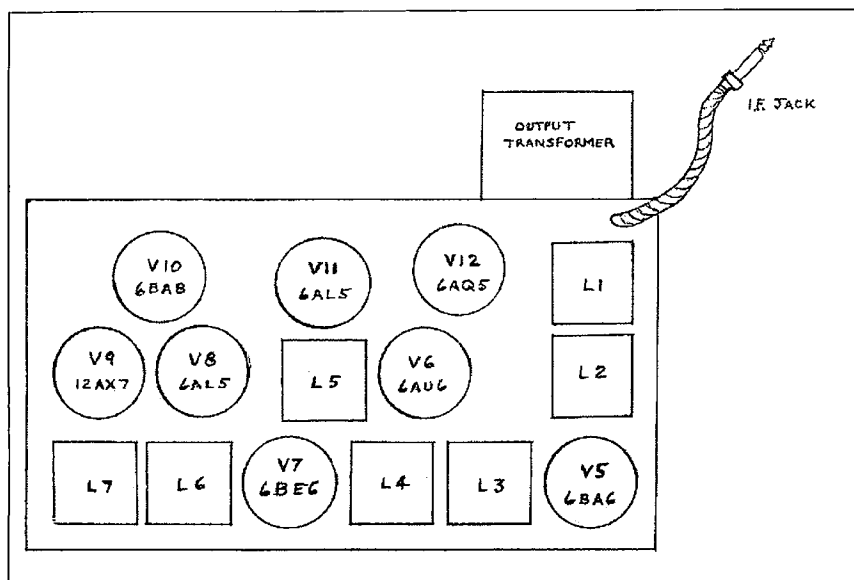
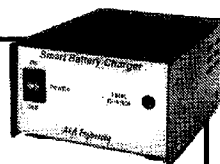


Fig. 1. General layout of the tubes used in the KE-93 receiver's IF module.

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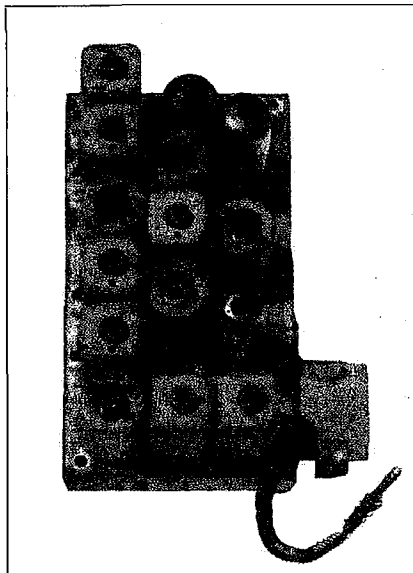


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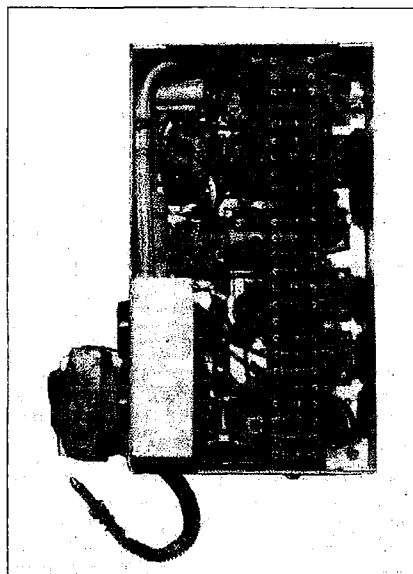




**Photo A.** Top side of the IF module showing the compact design. The audio output transformer is shown on the rear of the chassis.

measurement" using available equipment such as a calibrated output signal generator.

**Table 2** shows the band, frequency of measurement, and sensitivity value that I obtained for the KE-93. The numbers impressed me because no other tubed receiver had performed as well on my test bench. The only thing that I can attribute to the nice performance is



**Photo B.** Underside of the IF module showing the compact design. The audio output transformer is shown on the rear of the chassis.

the HI-Q turret tuner design. Of course, the low-noise 6BZ6 RF tube helps, too!

Before leaving the sensitivity performance, let's note that most competitive receivers exhibit a better sensitivity with the BFO turned "on" when compared to the AM mode. As I determined for the KE-93, the CW and AM sensitivity remained the same, and I was curious to determine why. What I discovered was that the KE-93 design reduces the BFO injection level when in the SSB mode when it is needed for proper SSB audio recovery.

The KE-93 was one of the first ham band receivers to be designed with SSB as an operating mode. Even though the receiver does not have a product detector, it's hard to tell that from the superb SSB performance that's exhibited.

When operating the receiver in the SSB mode, the AF gain is advanced to near maximum and the SENS level is reduced slightly. Yes, because of the sensitivity factor, the front end can overload when either the CW or SSB mode is selected and the RF gain is set too high. Backing down the SENS level (RF gain) slightly, the receiver became alive and performed well during my tests.

After tuning around the bands and listening to SSB signals, I noticed that the receiver was doing a pretty good job of separating adjacent signals. This raised my curiosity as to the IF's bandwidth. I ran a number of cursory tests and came up with a bandwidth of about 2 kHz. I couldn't determine the shape factor, so I can't comment in that regard.

#### IF module

While preparing the receiver for the application of power, I removed the IF module from the rear deck of the receiver and examined it. Because of the compact design, it was very difficult to work up a signal path, but I eventually got enough information to develop the signal path block diagram. **Fig. 1** and **Photo A** show the top side of the module layout identifying the tubes and IF transformers.

To remove the IF module from the

receiver, I used the following procedure:

1. Pulled back the two connectors located on the underside of the receiver's chassis.
2. Pulled the IF wire/plug from the RF deck.
3. Removed the two screws located on opposite corners of the module.
4. Carefully lifted the module until the connector panel cleared the receiver's chassis.
5. Tilted the module up slightly to achieve connector panel clearance, then moved the module rearward.

A visual inspection of the underside (see **Photo B**) allowed me to detect two capacitor problems and one resistor problem. The 12  $\mu$ F filter capacitor connected to the cathode of tube V9 had a cracked ceramic case. The other capacitor was a dried-out electrolytic capacitor connected to the cathode of tube V12. Finding the mechanically bad 1/2 watt resistor was interesting. The resistance value had shifted from 4.7k to nearly 9k ohms, and I was really surprised to find a resistance shift in a molded carbon resistor. However, what caught my eye was a very small chip knocked off of the corner of the resistor body near one lead.

When removed from the receiver, performance testing and voltage measurements on the IF module for troubleshooting purposes are difficult without an external test fixture. Due to the compact design and shielding, the bottom of the module is covered with metal, preventing circuit access while the IF is mounted.

The resistance chart shown in part 2, **Fig. 2**, could be helpful should a problem exist within the IF module. With the module removed from the receiver, several of the circuits will appear to be open, but they would normally be completed with the module mounted to the receiver.

#### Cleaning operation/notes

Cleaning of the Pierson KE-93 was limited to washing the faceplate casting and the cabinet. For the faceplate casting, I scrubbed it with a toothbrush

*Continued on page 57*



Phil Whitchurch G3SWH  
21 Dickensons Grove  
Congresbury  
Bristol  
BS49 5HQ  
United Kingdom

# The Call of the Maldives

*8Q7WH, that is ...*

*After our eventful visit to Sri Lanka in November 2000, there was not much doubt about where our next trip would be, mainly due to the fact that our flight home was routed via Male and Abu Dhabi.*

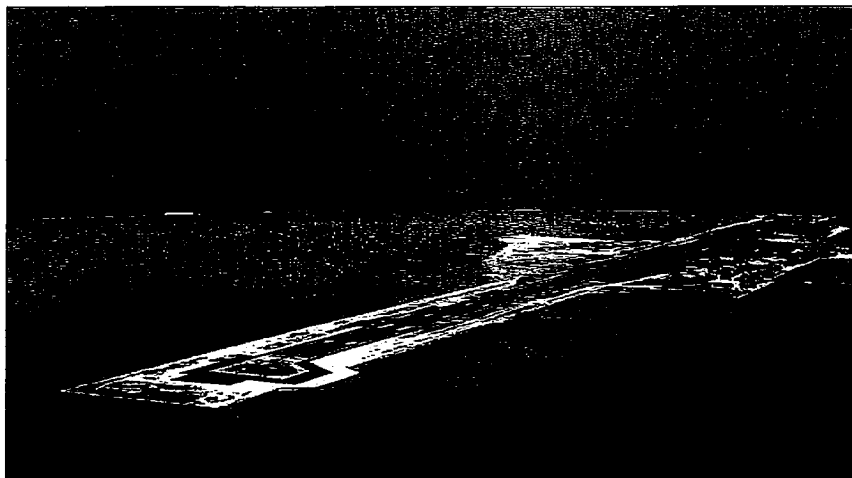
After an hour's flight, we spent a further hour on the ground in Male airport and were able to get off the plane and wander around the duty-free shops, etc. Jan fell in love with the posters on the walls depicting white sand and simple water bungalows linked with a system of jet-ties. Although we have tended to steer clear of beach holidays and pursued more "activity" types of vacations, it certainly looked tempting. Jan said, "I think I could stand a week here." I said, "It's ever so easy to get a license."

Taking off from Male, we were treated to breathtaking aerial views of the archipelago, with innumerable tiny islands poking above the coral reefs.

Once back in the grips of the UK winter, time was spent scanning over the travel sections of the weekend papers. Last year's sojourn to Mykonos had been beset with poor weather and was not as successful as in previous years, so we decided to look elsewhere. It wasn't long before Jan spotted a Travel Collection advertisement offering an all-inclusive week in June

on one of the Maldivian islands at a price which suited our budget. A copy of the *Lonely Planet* was swiftly purchased, the deposit paid, and a seaplane transfer arranged.

OH2MCN's Web site once again came up with good information about the licensing procedure. This merely involved downloading a copy of the application form, completing and sending it to the licensing authorities by fax on 15th January, together with a copy of my UK license and a covering letter asking for the callsign 8Q7WH. I received a fax almost by return confirming the callsign had been reserved and asking me to arrange for the fee of 125 Maldivian rufiya (MRF) — about US \$10 — to be paid by my tour operator's agent in Male. This proved to be one of the most difficult parts of the whole procedure and involved contacting Travel Collection by E-mail (no response) and fax (not received), and sitting in a telephone queuing system for up to 15 minutes at a time. Eventually, I received a copy of the three months' license by fax on 3rd April, together with a note that this document would enable me temporarily to import my radio equipment.



*Photo A. An aerial view of the airport on its own separate island.*





*Photo B. A Twin Otter seaplane.*

The Maldives are an independent country within the British Commonwealth and consist of over 1,000 low-lying coral islands grouped in 26 atolls about 600 km southwest of Sri Lanka. No natural land stands greater than 2.4 meters above sea level!

The ocean around the Maldives is world-renowned for the snorkeling and scuba diving. My good friend Bruce Sawyer ZF2NT spends six months of the year diving on Little Cayman and told me he believed the diving in the Maldives to be superior to the Caymans. Neither Jan nor I are very strong swimmers, so we decided to learn to snorkel properly and attended a number of informal lessons

during the weeks preceding our departure. I even tried on an aqualung at one stage and would not have needed much encouragement to turn the snorkeling into diving, but Jan was not so keen. Considering the length of rope which I get playing radio on holiday, I decided that a second activity excluding Jan was not a good idea, and so drew the line at snorkeling.

Check-in at Gatwick was uneventful and the ski bag containing the R-7000 vertical raised no eyebrows. Jan and I split the radio equipment between our respective hand luggage, and there was a difficult moment at the departure gate when the clerk declared mine to be too heavy and asked that it be placed in the hold. Fortunately, I was

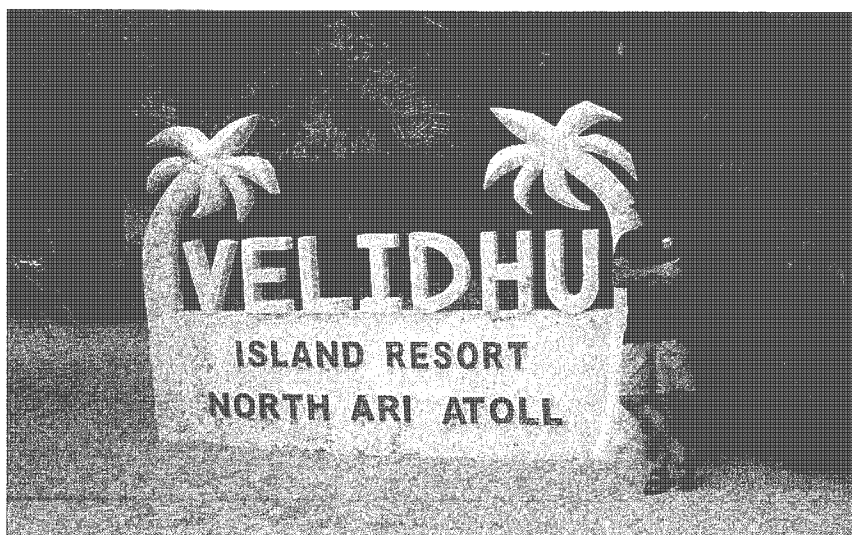
able to convince him of its fragility and kept it under my control throughout the flight. There was a short stop at Bahrain to refuel and change crews, and we arrived at Male on time on 4th June. The baggage, including the R-7000, also arrived, and after subjecting it to an X-ray examination by customs we made our way to the seaplane terminal for the 30 minute flight to Velidhu Island in North Ari Atoll, about 85 km to the west of Male. The aircraft was a Twin Otter, and I was amazed to find it to be fitted with an Icom IC-706 tuned to 3407 kHz.

Islam is the religion of the Maldives and no alcohol or pork is permitted on any of the 202 "inhabited" islands. Velidhu is one of 90 or so island resorts, which are officially "uninhabited" — i.e., no Maldivians live there on a permanent basis. Consequently, there are no restrictions on the consumption of alcohol, etc. The island covers some 19 acres and has 80 individual, circular bungalows with thatched roofs, known as rondavels, scattered amidst the palm trees and lush vegetation. There are also 10 overwater bungalows on the northwest side of the island, which were available at an extra cost of US \$50 per day.

Arriving at the island, we were personally welcomed by the hotel manager and very quickly checked into our most comfortable, double-bedded, ensuite rondavel. Contrary to the Travel Collection's handouts, there was one

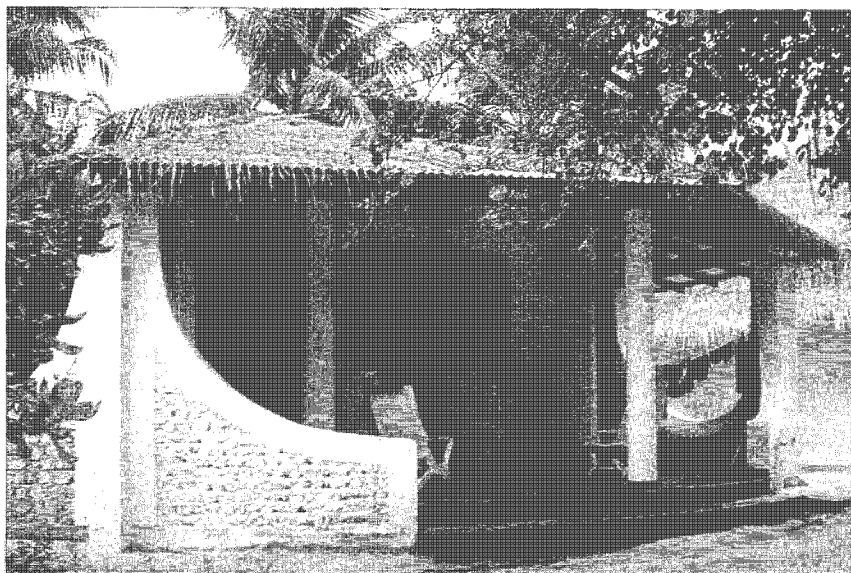


*Photo C. Velidhu Island from the air.*



*Photo D. Proof that I was there!*





**Photo E.** Our rondavel.

of their representatives on hand who theoretically also looked after the guests in six other resorts. In view of the difficulties in traveling between her resorts, she rarely seemed to leave Velidhu! She greeted us with "Mr. Whitchurch, have you got your radio license?" When I said not, she explained that she had sent it to Male to be handed to me on arrival, just in case of any problems with the customs, but that she would retrieve it and give it to me during the next day or so.

By now the daylight was failing and I wanted to get the antenna erected before dark if at all possible. Our rondavel was on the east side of the

island with a screen of bushes between it and the beach. I would have liked to put the R-7000 on the beach itself but was worried that I could not anchor it properly in the soft sand and that, as it would be out of sight, someone might injure himself or herself by tripping over a guy rope. Consequently, I set it up in a clearing between two of the rondavels and guyed it to the trunks of trees to minimize the tripping hazard. There was nowhere to rig a wire antenna as an alternative, because the numerous palm trees were all too short and close together.

It was now fully dark and, after a much-needed shower, we made our



**Photo F.** The R-7000 antenna set up in a clearing between two rondavels.

way to the bar and a pre-dinner drink. Under the "all-inclusive" deal, in addition to all meals we were entitled to unlimited quantities of free beer, cocktails, spirits and soft drinks in the bar and to glasses of red or white wine in the restaurant. Jan and I are both wine drinkers and found it strange that wine was not available in the bar, except at extra cost. Over an aperitif we struck up a conversation with a couple that had been on the seaplane with us, during the course of which we discovered that they lived in a small village near Bristol. Further enquiries established that they actually lived about 200 yards away from us and had several acquaintances in common, although we had never previously met. Indeed, it is a small world!

Dinner was a first-class buffet eaten with our new friends, and we were well looked after by our waiter Mohammed, who kept us well supplied with glasses of excellent Californian wine. Mohammed was a Maldivian national, although most of the staff were Sri Lankan or Bangladeshi. After dinner, we retired to the bar where I ordered brandy, which was served in a full wine glass. At this point, I came to the conclusion that an "all-inclusive" deal was potentially dangerous!

Next morning I was up early, feeling surprisingly bright. I set up the station on the patio outside the room, straightened the antenna and put out a few



**Photo G.** Phil Whitchurch G3SWH.



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calls on 21 MHz CW. The first QSO was with 9M2SZ at 0347 UTC on 5th June, but the band was very quiet so I went back to bed and we both slept late, missing breakfast. The patio furniture was designed for relaxation and therefore not very practical for radio operations, so I arranged for a "normal" height table and chair, which was altogether more comfortable.

In March 1998 an El Niño (temporarily increase in seawater temperature) event bleached much of the coral throughout the archipelago, killing most of the algae living within the coral polyps, particularly in the shallow waters. Consequently, the coral itself is mostly an unsightly brown color, but with some more colorful new growth showing through in places. Despite this, the house reef provided excellent snorkeling for beginners like us, with myriads of multicolored fish of all sizes to be seen, including parrotfish, blue surgeonfish, rock cod and eagle rays. A particular favorite was a triggerfish that frequented the water around the jetty and could be fed with pieces of bread stolen from the breakfast buffet.

Radiowise, I found that my usual pattern of a session in the mornings and a session in the late afternoons didn't work. Admittedly, the first couple of morning suffered from the "all-inclusive" syndrome, but even then the activity just wasn't there. The late afternoon session was much more productive, with a couple of very satisfying pile-ups of Far East stations on 18 and 21 MHz. QSOs with Europe and the USA were very few and far between. This was probably due to the fact that we were on the east side of the island and the path to Europe was straight through the island's vegetation. 28 MHz was unusable due to intruders using CB-type radios for inter-island communications.

We wanted to see something of the true culture of the country, but escaping from the island was slightly difficult. We finally managed to negotiate a 20-minute ride on a speedboat to the neighboring "inhabited" island of Mathiveri. Mohammed asked if he could join us, as he had a friend there

who he would like to visit. As it was his off-duty time, we readily agreed, fully expecting him to disappear on arrival and reappear at the agreed departure time. We were pleasantly surprised, as we were introduced to his friend and family, given fresh coconut milk to drink through a straw in the shell and fresh papaya to eat before being escorted around the village. About 600 people live on the island and make a living by fishing and boat-building. They were extremely friendly and quite happy to be photographed without requiring payment in advance. The immediately viewable image on the small screen of Jan's digital camera was of great interest, particularly to the children.

I had set myself a target of 1,500 QSOs during the week, but found that I had only made just over 1,050 by the start of our last day. I'm afraid that I made myself rather unpopular with Jan by spending too much time on the radio on the last day, but I did bring the final total up to 1,345, the last 200 or so being very slow going indeed, with many unanswered CQ calls.

Despite daily enquiries of the Travel Collection's representative, retrieving the original license document from Male proved impossible and I was able eventually to collect it at the airport just prior to checking in for the return flight.

The breakdown of QSOs by band and DXCC entity went like this (band/QSOs/DXCC): 30/1/1, 20/63/12, 17/314/35, 15/707/57, 12/260/32, all/1345/71.

Special QSL cards have been printed and are available from either my *Callbook* address with return postage and SAE or via the RSGB bureau. I have been particularly surprised at the number of direct requests already received from Japanese stations.

My particular thanks go to my XYL Jan; Abdullah Rasheed, Director of Engineering at the Ministry of Communication, Science & Technology; and Anthony Perera, General Manager of the Velidhu Island Resort and his most friendly and courteous staff, without whose help and cooperation this operation would not have been possible.



# Easy-Build Project of the Month

*This time: 400 kHz AC low pass filter for 120 VAC 60 Hz line filtering.*

*Tired of the neighbor's noise generators messing up your TV and stereo receiver? Or maybe Mama using her kitchen mixer or the like when you are trying to work that weak DX station over the S-9 noise level? Well, you get the idea of what this filter can do for you. It also has a fuse and surge protection MOV device to provide maximum usefulness.*

**T**he filter is basically a 400 kHz and below low pass filter. Since it is a common mode design it is equivalent to a toroidal bifilar-wound inductor. In short, it cancels noise and inrush current and voltage spikes between the neutral and power lines. The slugs of energy developed are then capacitive-coupled to the common ground return back to the circuit breaker power distribution box.

A nice side use is in the bathroom or where GFI ground fault interrupter devices are used. We know these devices are real noise makers but are required if power is within six feet of water or plumbing. If you like a radio in the bathroom when soaking, the GFI will keep you safe and the filter will reduce the GFI noise to a tolerable level (or maybe completely). AM stations may still have some interference, but the FM stations sound pretty good.

This filter device can also be used on 240 VAC if a double-wide enclosure is used and two filter assemblies are enclosed. The MOV should be either a 130 or 150 VAC device. The Pulse Engineering dual-common-mode 8.2 mH choke is rated at 5 amps 250 VAC. The windings are about 0.2 ohms each.

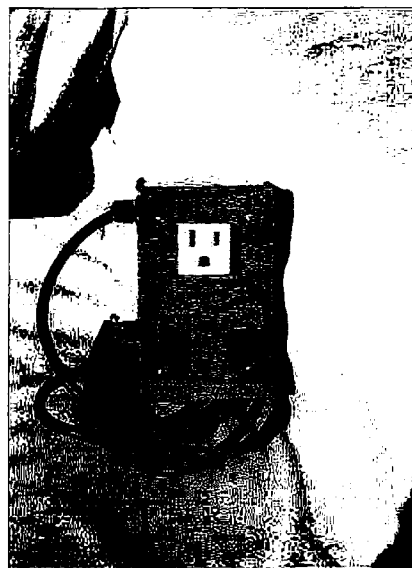
See **Fig. 1**, the schematic, and **Photo B**, the assembly photograph, to get a better idea of what the filter system looks like.

Another application that was found was for DC use. Your 6 V or 12 V wall converters or mobile automotive 14 V battery system can be filtered dramatically with this filter. Make sure you change the MOV to handle the DC trip levels. Generally the AC-specified device has a 60% increase in the trip point level with DC use. An example is the 5 VAC MOV, which has an 8 VDC specification. I often use two 5 VAC devices in series to form a 16 VDC device for use with a 14 VDC battery system. When used in a DC application, make sure you do not exceed that 5 amp current limit of the dual choke. The internal bobbin wire is still limited on current.

In a DC application, you can put the +V source on one winding and the -V on the other winding. The ground can be connected to the grounding point on the equipment system. In the case of wall converters, the capacitors have no real effect. Only the dual choke comes into play. Digital equipment generates large amounts of noise on the DC

lines, so filtering from the wall converter is very beneficial. It not only isolates noise from entering the instrument, but also keeps noise from being placed onto the 120 VAC lines. This is especially useful to keep your rig's RF off of the power lines. Only the radiated RF will need to be dealt with in that case.

The component sources are listed at



**Photo A.** Make sure the lid markings indicate that this is not for exterior use.



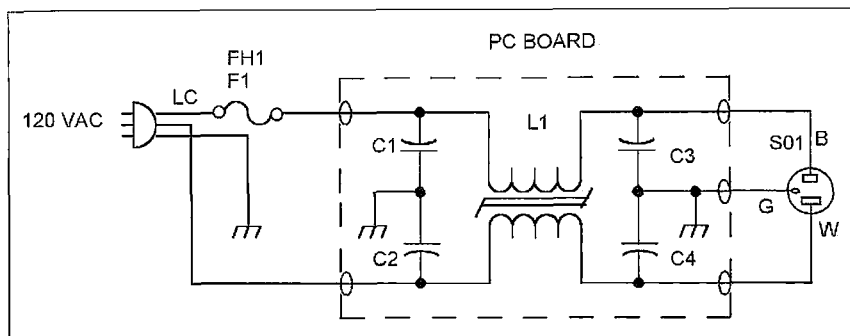


Fig. 1. 400-kHz AC Line Filter schematic.

the end of this article. Hosfelt Electronics can provide the Pulse Engineering PE-96180 dual choke for about 35 cents and the AC box capacitors at about 5 cents each. This is a good deal! They also have MOV and fuseholder devices, as do other sources including your local Radio Shack retail store.

The line cord and strain relief can be purchased from these sources as well as your local home improvement centers. I recommend using AWG-18 hook-up wire to the NEMAL receptacle. Four nylon low standoffs can also be purchased from Hosfelt Electronics at reasonable prices. The PC boards are available from FAR Circuits at \$4.00 each plus S/H \$1.50. This is quite a bargain for high-quality FR4 glass boards that are silk-screened with component information. The S/H charge covers up to four boards, and I do recommend purchasing more than one board.

I used a standard gray PVC 2x4 outdoor enclosure and lid at about \$6.00 from your local home improvement store in the electrical department. Using a 5/8" Forstner drill bit, the fuse hole and NEMAL socket/receptacle hole can be cut easily. Use a coping saw or saber saw to cut the square hole for the NEMAL socket. Clean up and square off using a double-cut file. Snap in the socket, then use a little clear 100% silicone caulk on the rear side to provide a secure attachment to the lid. It must be safe and secure, since we are fooling around with 120 VAC and National Electrical Code (NEC) requirements apply. Make sure that your line cord is a three-pronged NEMAL-type, or the filter will not work properly. Mount the circuit board in the enclosure bottom using the silicone caulk on the four nylon standoffs or nylon screws.

I did decide to use an indelible ink pen, sometimes called a felt marker, to

mark the fuse rating and label information. The marking pens are available from your local post office at \$1.00 each — what a deal!

One word of caution. This is not for exterior use. It is neither watertight nor GFI-protected. Make the lid markings indicate accordingly.

For those who think two are better than one, I found that two filter stages in series did not justify the additional cost. One filter does it just fine! Now, on to the next project!

## Sources

1. Hosfelt Electronics, catalog: 1 (800) 524-6464.
2. FAR Circuits, 18N640 Field Ct., Dundee IL 60118 ("K8IHQ Filter").
3. Local: home improvement store or electrical supply.

Qty.	Name	Description	Source	Cost
1	PCB	Printed circuit board	FAR Circuits	\$4.00
1	Box	PVC electrical box	Local	5.00
1	Cov	PVC box cover	Local	1.00
1	FH1	Fuse holder 3AG	Hosfelt 43-206	.75
1	F1	Fuse 5A 3AG	Hosfelt 31-050	.10
1	SO1	AC receptacle NEMAL 3-prong	Hosfelt 21-365	.65
1	L1	Dual 8mH 5A choke (PE-96180)	Hosfelt 18-129	.35
4	C1-4	0.1 µF 250 VAC box cap	Mouser #5989-250V.1	.26 ea.
			OR Mouser #539-158X104	.66 ea.
1	Z1	130 VAC MOV (20mm)	Hosfelt V130LA-20B	.59
1	LC	Line cord (3-prong) NEMAL	Hosfelt 60-370	1.75
1	SR	0.5 in. strain relief	Local	.20
4	—	0.5 in. nylon standoffs 6-32	Hosfelt 28-149	1.00
4	—	0.25 in. nylon screws 6-32	Hosfelt 28-128	.40
Total				\$15.99

Table 1. Parts list.

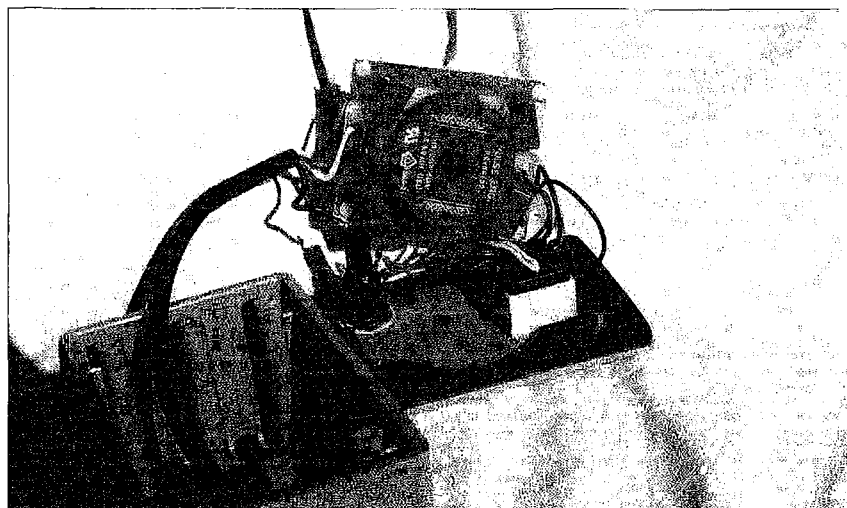


Photo B. A view of the filter system assembly.



Wallace Edward Brand;  
Malcolm Watts, N.Z.C.E.; and  
John W. Wagner W8AHB  
3890 Tubbs Rd.  
Ann Arbor MI 48103  
[jwwagner@concentric.net]

# Tesla: Inventor of Radio and Modern-Day AC

*(Marconi and Edison notwithstanding.)*

*Popular beliefs in history are often not factual and cannot bear scrutiny. Such is the case for the history of electricity, which ultimately led to radio.*

From the time man started his upward march toward an advanced technological society, only a few exceptional scientists have left indelible marks. Nikola Tesla was one of those few. Born in 1856 of Serbian parents in what was once the great Austro-Hungarian Empire, and educated at the Austrian Polytechnic School in Graz, he emigrated to the United States in 1884 and became an American citizen.

Tesla brought with him the secret of how to unleash an awesome power never imagined by his contemporaries ... the power upon which, today, the entire world runs ... polyphase alternating current (AC).

The illnesses Tesla suffered during his childhood almost killed him. Later, as an adult, the ridicule and rejection he suffered, after showering the world with many of nature's most elusive secrets, were severe enough to stifle most men, yet he remained dedicated to science. The great German philosopher Arthur Schopenhauer probably said it best when he stated: "All truth passes through three stages: First, it is ridiculed; Second, it is violently opposed; and Third, it is accepted as self-evident."

Such is the story of Nikola Tesla and his struggle to make AC the world standard. His rotating magnetic field principle, basic to all power generation and electric motors, is as eternal as the wheel. Indeed, it has become as common as the wheel, and without it, the world would be quite different.

The story of the rise of electric power is long, and no one man should have exclusive credit for its creation. Others, such as Hans Christian Oersted and Michael Faraday, made significant discoveries in electrical science. Their discoveries of electromagnetism and electromagnetic induction, respectively, were pivotal breakthroughs; without them, Tesla would not have been able to unleash the awesome power contained in the electrical genie Faraday discovered in 1831.

For 51 years after Faraday's discovery, investigators struggled to increase the electrical output of Faraday's embryonic generator. Gradually, magneto-electric generators became available, and by 1872 the direct current (DC) generator reached its peak of refinement.

Nevertheless, all such generators proved to be inefficient and troublesome, creating sparks and requiring frequent maintenance. Moreover, DC

power was inherently inferior because its losses increase as a function of the inverse square of the voltage. End-use voltage has to be relatively low for safety reasons. With no inexpensive method of changing the voltage of DC electricity, the voltage of generation, transmission, and distribution of DC power had to be the same as the low voltage of use.

Unless massive copper bars as conductors are used to transmit all the amperes necessary to transmit a large quantity of power at low voltage, it is impractical to distribute DC a distance greater than 1/2 mile from the generating station. With AC power, the relatively inexpensive transformer changes the voltage from high voltage transmission (over pencil-thin conductors) to low voltage distribution ... and use.

Nineteenth-century technologists believed DC power was their only option for harnessing Faraday's discovery. Everyone believed naturally occurring AC was useless ... akin to a perpetual motion machine. Tesla's discovery of the rotating magnetic field principle proved everyone wrong. As the Circuit Court in Connecticut concluded in upholding Tesla's claim of invention against attacks on its novelty, "What



others looked upon as only invincible barriers ... he [Tesla] brought under control, and ... taught how to utilize in practical motors in distant cities the power of Niagara" [Westinghouse Elec. & Mfg. Co. v. New England Granite Co., Vol. 103, *Federal Reporter*, p. 951, at p. 972 (D. Conn.—1900); affirmed by the Circuit Court of

Appeals, Second Circuit, 110 F 753 (CA2—1901)].

After Thomas Edison invented the incandescent bulb, he immediately sought investors to fund the construction of power stations, using existing DC technology to power his lamps. His promoters immediately dubbed him "The King of Electricity," but his

role was strictly as an entrepreneur building larger generators than were already commercially available. Edison's brief foray into the power industry was nothing more than an anomaly, and he contributed nothing to the time line of scientific progress. His much-heralded Pearl Street Station in Manhattan produced the same DC as the much earlier arc-light DC central stations in San Francisco and other locations, so there can be no justification for scientific innovation. DC is merely a historic relic, and even its title does not belong to Edison.

While the rest of the world had their eyes fixed on Edison's promotion, Tesla was searching for a way to prove his AC theories. The answer came to him one day in 1882 as he was walking in a park reciting poetry. The idea appeared as a blinding flash in his mind, and he knew instantly that he had found the missing link in Faraday's great discovery ... how to extract the awesome electrical power contained in Michael Faraday's discovery 51 years earlier. Such was the power of his rotating magnetic field principle. Faraday's "new-born baby" suddenly became a giant in his mind. Moreover, Tesla never realized at the time how difficult a task he would have in overcoming ignorance and greed. Thomas Edison had spent millions of dollars of investors' money to promote existing, inefficient, DC technology, and he was not about to have his empire destroyed.

Tesla worked for Edison briefly, but he soon realized that Edison had fixed interests and that they were strictly entrepreneurial. Tesla had loftier goals, and they did not include wasting his time building Edison's power stations, which perpetuated a limited, inferior technology. He simply could not understand why Edison was unable to comprehend the superiority of his AC system.

George Westinghouse did not suffer Edison's shortsighted mentality. He knew Tesla had solved the energy problem that plagued scientists for more than 50 years, so he bought all of Tesla's patents on the polyphase AC system. Tesla had germinated the AC seed, and now it was the

Syllabus

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA v. THE UNITED STATES

[No. 33642. Decided November 4, 1935]

On the Proofs

*Patents; improvements in wireless telegraphy; validity and infringement.*—On the questions of validity and infringement of the following patents for improvements in wireless telegraphy, the court held as follows: Marconi reissue patent No. 11913, held not infringed. Lodge patent 609154, held valid and infringed. Marconi patent 763772, held invalid except claim 16, which is held to be infringed. Fleming patent 803684, held invalid and not infringed.

*Royalty; construction of contract of sale.*—Where a contract of sale to the United States of certain wireless telegraph stations by the owner of patents on the equipment thereof provided that the contract price was for compensation in full to the seller, and that the Government was not bound to pay the seller any further sum as payment, royalty or other compensation "on account of its patent rights involved in any of the apparatus" thereby transferred; the exemption of the Government from payment of royalty on account of such patent rights extended only to the use of the particular apparatus or equipment transferred in the sale.

*Party entitled to sue for infringement.*—The general rule as to the right to sue for the infringement of a patent is that the right rests with the one who was owner of the patent at the time the infringement occurred.

*Infringement of combination.*—A new combination of elements, presenting a new arrangement, and producing new and beneficial results does not infringe a former combination by using some of the elements thereof.

*Validity of patent; application filed more than seven months after filing of foreign application.*—A patent is not invalid under section 4887 Revised Statutes, as amended, because the application therefor was filed more than seven months after the filing of application for a foreign patent unless the invention was also first patented in the foreign country.

*When invention "first patented" within meaning of section 4887 Revised Statutes.*—As used in section 4887 Revised Statutes, the term "first patented" means the time when the patentee's rights to the patent become fixed and determined, which in Great Britain is the date when the patent is "sealed."

*Laches of owner of patent in enforcing rights against infringers; effect upon subsequent owner.*—Where there was such laches on the part of the owner of a patent in enforcing its rights against infringers that interested persons might well believe the patent had been abandoned, a subsequent owner of the patent is not

Fig. 1. Excerpt from *Marconi Wireless Telegraph Company of America v. the United States*, 81 Ct. Cls.



entrepreneur's turn to cultivate the power industry and reap its rewards.

Westinghouse, using Tesla's AC patents, joined with General Electric Company and in 1895 created the Niagara Power Project, the first large-scale hydroelectric generating station in the world. A mere 74 years later, man was walking on the moon. Such was the impact of Tesla's discovery. Now, virtually unlimited electrical and mechanical power is available anywhere.

Is it not classic irony that today our perception of electrical history is so flawed that Tesla's name is largely unrecognized, and we pay tribute to Thomas Edison, the man who fought bitterly to defeat the rise of the polyphase AC electrical power used almost universally throughout the world today? Even our premier museum, the Smithsonian Institution, hails Mr. Edison as the founding father of our electrical power system, and recognizes Tesla only as the inventor of the AC motor. Its curator even attributes Edison's

incandescent lamp as being the catalyst for the second industrial revolution.

It was not the lamp that industry needed; it was the mechanical muscle of Tesla's AC motor and the power to make it run that sparked the second industrial revolution. But the greatest triumph of the polyphase AC system was that its use permitted the integration of utility systems to permit taking advantage of overwhelming scale economies in generation. No more was it necessary to have an isolated generating source for each different use of electric power.

Tesla's intellect was such that once he had solved the AC conundrum, he continued his investigations into the world above 60 cycles (AC) ... high frequency. A few years earlier, the brilliant Scottish mathematician, James Clerk Maxwell, established the laws of electrodynamics by formulating four equations defining electromagnetic theory. He concluded that it is possible to transmit energy by electromagnetic waves at the speed of light.

Later, Professor Heinrich Hertz, in Germany, set out to interpret and prove Maxwell's work experimentally. His experiments proved those postulates — that electromagnetic waves are indeed propagated in air at the speed of light. Maxwell and Hertz had now laid the groundwork for someone to follow in their footsteps and create a system for transmitting and receiving intelligence.

Nikola Tesla was the first to recognize the need to investigate the properties of high frequency alternating currents ... probably because of Edison's attacks on his high voltage AC transmission system as unsafe. The so-called "skin effect" of high frequency reduced its danger; and this work with high frequency electric power led to his system of transmitting intelligence (radio).

Tesla invented a high frequency air core transformer capable of producing high voltages at very high frequencies. It became known as a Tesla coil. In doing so, he discovered the secret of

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electrical resonance, a fundamental necessity in all electronic circuitry. Tesla again proved he was both scientist and technologist, someone who could discover new scientific truths that advanced earlier beliefs and then made them work in a practical way. In short, he was the link between the pure scientists and the technologists who followed.

History is not kind to Tesla, although all of us are the benefactors of his creative genius. The main reason his name is not a household word is that he left no industry or family to perpetuate his memory. Nevertheless, his legacy — whether or not we acknowledge it — is all around us in the electricity that powers our homes, schools, and factories, and in the AC motors powering the many machines that make our lives comfortable.

There is an overwhelming belief that Thomas Alva Edison was the chief architect of our electrical society, and that Marchese Guglielmo Marconi was the inventor of radio. Nonetheless, there is indisputable evidence clearly showing that Nikola Tesla was not only the father of polyphase AC electricity transmission, but also the father of radio.

Litigation again is helpful in establishing priority of invention of radio, just as it did for polyphase AC transmission. The granting of a patent, by itself, is not wholly determinative of invention because that is an *ex parte*, or one-sided proceeding. Usually no one is opposing its grant with facts (outside those readily available to the patent examiner), tending to show that the claims of the patent applicant were unwarranted. The patent examiner is some help in avoiding grants based on unwarranted claims of invention, but his study is limited to papers on file in the patent office or available to him without great effort and expense. Even concerning those, he is frequently dependent on the honesty of the lawyer for the applicant in bringing prior art to his attention.

In the case of radio, as well as electric power systems, two-party patent litigation, and sometimes other litigation, fortunately is available to help in

determining priority of invention. Such litigation with respect to radio came to the U.S. Court of Claims when Marconi filed a claim against the government for the taking of his intellectual property involved in four patents; two claimed to be invented by him, one in which the claimed inventor was Sir Oliver Lodge and assigned to Marconi, and one by J.A. Fleming, also assigned to Marconi.

Four patents were involved. The first was a patent by Marconi for a two-circuit system for transmitting signals and receiving them remotely with one circuit in the transmitter and one in the receiver. A current analysis by an expert in electrodynamics (below) shows that this was not a viable system of radio communication.

The two-circuit patent was Re-issue No. 11,913 (Original No. 586,193), granted to Guglielmo Marconi on June 4, 1901, for transmitting electrical impulses and signals and the apparatus therefore.

The second patent was for a four-circuit system of wireless telegraphy, No. 763,772, granted to G. Marconi on June 28, 1904. This patent is the key to the invention of radio. The question for the court was whether the patent was properly issued to Marconi, who claimed to be its inventor, or whether its issuance was invalid because of prior art.

The third patent at issue was No. 609,154, for the use of a variable inductance in tuning a circuit to resonance with another, granted to O.J. Lodge on August 16, 1898; and the fourth patent was for a rectifier tube, No. 803,864, granted to J.A. Fleming on November 7, 1905. The total damages claim was for \$6,000,000 — which in 1916 was a lot of money — and justified full development of the facts by the parties to the litigation.

The findings of fact and opinion of the lower court (Court of Claims) can be found in *Marconi Wireless Telegraph Company of America v. The United States*, 81 Ct. Cls. 671 (1935), affirmed in major part by the Supreme Court 320 US 1 (1943).

The Court of Claims decided that the government did not infringe on

Marconi's two-circuit patent. The government's suppliers had not used that technology because long before World War I, it was already obsolete. It held that each of the components Marconi utilized in the two-circuit system was invented by others, but that possibly the combining of them justified a claim of invention for the two-circuit system (even though it was not a viable system of radio). Moreover, the four-circuit system had revolutionized the art. Clearly, the focus of the litigation in the Court of Claims was on the four-circuit patent.

During the more than three years after Marconi's initial filing of the key four-circuit patent on June 28, 1904 was rejected for prior art, new applications and petitions for revival were filed and rejected by reason of the prior art set forth in the Braun British patent, Lodge No. 609,154, and Marconi No. 627,650, but principally in Tesla No. 645,576.

In the early 1930s, the Court of Claims carefully analyzed Marconi's claim of invention of the four-circuit system. Its examination showed how patent office examiners time and again rejected Marconi's claim on the four-circuit system due to Tesla's prior patent for the identical apparatus, his "prior art." It held that it was not necessary even to consider the Stone claim, which was prior to Marconi's but after Tesla's, because Stone himself credited Tesla with its invention. [John Stone (1869–1943), one of the many early pioneers of radio, gave Tesla full credit for its invention.]

At long last, Marconi had persuaded the patent office to reconsider and grant the patent. Was it only by coincidence that this occurred just after the influential investment banker, Morgan, gave his backing to Marconi? Both the Court of Claims, and later the Supreme Court, in affirming the decision of the Court of Claims, remarked that the first examiners were correct, and there was no apparent justification for the *volte face* of the last examiner who granted Marconi the invalid patent on the four-circuit system (opinion of the Court of Claims on Liability, 81 Ct. Cls. 671, 760 to 768).



"It is sometimes said [by those denigrating Tesla's invention of radio] that Tesla's purpose was only to transmit electrical energy, but the electrical waves transmitted by any wireless system are merely one form of electrical energy. Moreover, the specification of Tesla's patent recited that the method of energy transmission would be useful when it was desired to transmit intelligible messages to great distances. In view of this statement, it is within the knowledge of those skilled in the art to interrupt the continuous generation of high frequency energy in the transmitting system by a telegraph key, and substitute for the current receiving instrumentalities disclosed in connection with the receiving system, a radio signal detector device."

The only thing left is to determine of what significance is the Court of Claims' marginal award of invention to Marconi for the two-circuit system.

First, the government's lawyer claimed that Marconi's two-circuit system was basically the same system used by Hertz to verify the theories of James Clerk Maxwell. Brief at 41.

Second, this is what Marconi's own lawyer said of the two-circuit system: "Marconi, in 1894, learned of the Hertz 1888 experiments and in 1896 filed an application in the United States, upon which was granted the patent which was reissued as 11,913. That patent, formerly in suit, described a sending station and a receiving station without any tuned circuits. This system would operate, but only at short distances, because there was too much waste of energy. The transmitting antenna would quickly, and not persistently, radiate the energy applied to it, with the result that the train of ether waves would be too short instead of being sustained. And at the receiving station, the antenna likewise would quickly absorb the received waves, instead of storing them up, and the antenna also would receive undesired waves from other transmitting antennas [citations omitted]. The Lodge patent formerly in suit was an improvement; both the transmitting and the receiving antennas being tuned with inductance, so that each would vibrate longer and

the receiver would be more selective (inductance in an electrical system is the same as inertia in a physical system). Moreover, even with the Lodge patent, signaling only to short distances, about eighty miles, was all that was possible before the invention of the [four-circuit] system which enabled communication in 1901 over a

distance of more than 6,000 miles [citations omitted]." Brief for Petitioner and Cross-Respondent, March, 1943, at p. 16.

According to the Corum brothers, who are prominent experimenters with Tesla coils, "Tesla's stroke of genius was to use tuned coupled coils, move the energy storage capacitance to the

Reporter's Statement of the Case

Marconi reissue #11913 and Lodge #609154, and assigned these patents, together with all claims for profits and damages by reason of past infringement, except for the same reservation previously mentioned.

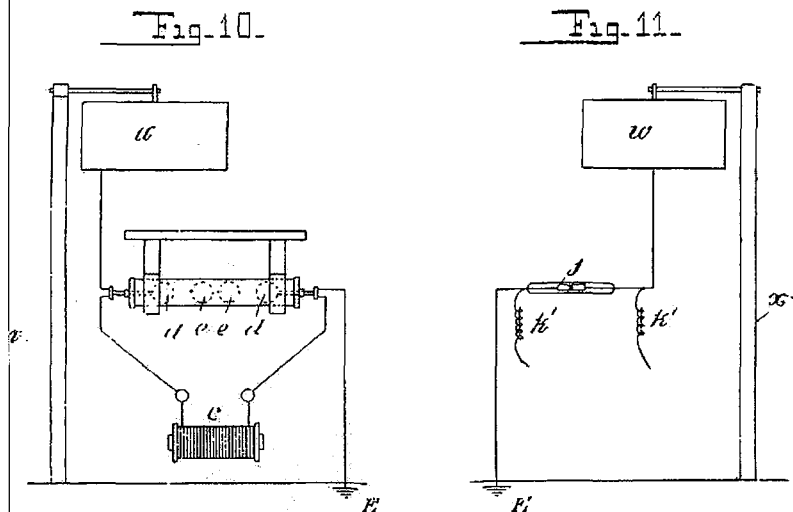
These three assignments, being exhibit 362, are by reference made a part of this finding.

MARCONI REISSUE #11913

IX. The reissue patent #11913 relates to a—

"complete system or mechanism capable of artificially producing Hertz oscillations and forming the same into and propagating them as definite signals and capable of receiving and reproducing, telegraphically, such definite signals; \* \* \*"

The embodiment shown by figs. 10 and 11 of the patent, reproduced below, is the basis of the alleged infringement.



To one skilled in the art a transmitting station is shown at fig. 10, having a Morse key and battery in the primary circuit, not shown, of an induction or Ruhmkorff coil *c* or other source of high tension, high frequency current. A spark gap *d, e, d*, in the secondary circuit has one side grounded at *E* and the other side connected to an elevated wire and plate *w* insulated from the earth on the pole *v*.

The receiving station in fig. 11 has a coherer or imperfect electrical contact type detector *j* connected on one side to an elevated conductor *w* insulated from the earth, while-

Fig. 2. Another excerpt.



primary side, and to add a ground connection. Tesla was the first to inductively couple the secondary circuit [where the capacitance must be small] to a tuned primary circuit, where the energy storage element [capacitance] may be huge by comparison. This remarkable innovation made possible the generation of RF signals immensely more powerful than Hertz's apparatus [and therefore the apparatus in Marconi's reissue patent] (*TCTUTOR* at page 13. J&K Corum, D. Edwards, Corum & Associates, Windsor, Ohio, 1988, ISBN 0-924758-01-5). According to the Corums, Hertz calculated his peak power at 16 kW. They concluded that his average radiated power was trifling. In contrast, at Colorado Springs, in 1899, Tesla's average power was in excess of 250 kW and his peak power exceeded 76 megawatts — a long way from Hertz in just a decade. *Ibid.*

Third, even Justice Frankfurter, who dissented bitterly in favor of Marconi, acknowledged that the two-circuit patent was not a significant factor in the innovation of radio: "That patent did not embrace many of the crucial claims here involved and its product cannot compare in commercial usefulness with that of the patent in suit." 320 U.S. 1 at 64, footnote 3.

The following technical evaluation will clearly show the unviability of the two-circuit system as a means for transmitting intelligence:

(1) **Abstract.** This work examines the characteristics of the two-circuit radio transmission and reception system (Patent Re-issue No. 11,913) used by Marconi prior to the development of the four-circuit system. The findings are that the circuit as described in the named patent is an unviable system of radio communication owing to a number of drawbacks (to be examined in detail). In particular, findings include a wide inherent bandwidth in the system (consider the implications of this in the usage of today's radio frequency allocations) and limitations on the signal and receptive power of the system as described in the patent (affecting coverage and transmission distance).

(2) **Transmitter Characteristics (and their implications).** The circuit

diagram of the transmitter [Marconi Wireless Telegraph Company of America v. The United States — Fig. 10, 81 Ct. Cls. at p. 677] shows a conducting plate (u) suspended by insulating pole (v) to which is attached a vertically hanging wire connected to one end of spark gap (d,e,e,d). The other end of the gap is connected by a wire to earth. Across the spark gap is connected an AC power source (c) (see Fig. 2).

### Observations

It is not obvious from the diagram of Marconi's two circuit apparatus (reproduced in the court's findings of fact) at exactly which point along the total length of the wire the spark gap is connected. This may have an influence on the resonant mode of the system (due to impedances associated with the power supply with respect to ground), but it is also true that any monopole resonator such as this will respond to a number of frequencies. (This is easily demonstrated both by doing a frequency sweep of such a circuit using a sweep generator and spectrum analyzer, and is also shown in graphic detail in a simple mechanical system — a metal ruler standing in a vise is an example of such a resonator.) It is assumed that the dominant 1/4-wave mode is being used.

### Consequences

A conflicting set of requirements arises from the desirability of the system to be narrow band (selective) on one hand and a good radiator on the other. This is not necessarily an impediment to a good narrowband transmission (the antenna used in the typical AM station is unchanged except for the lack of a top-loading capacitance), and in modern radio stations the signal fed to the antenna is rigorously controlled with regard to frequency content.

In the transmitter in question, this is not so. The signal is generated by connecting a charged capacitance (upper wire + plate) to earth by a spark gap which conducts when the breakdown potential across it is

reached. Conduction in the gap takes place extremely rapidly (spark propagation of up to  $10^8$  cm/s) [*High Power Electronics*, Sargent & Dollinger, pub. TAB Books, Inc., ISBN 0-8306-9094-8, Ch. 6.1, pp. 187–190] and is essentially a step function. The result is the generation of a broad spectrum of frequencies whose harmonic content and harmonic amplitudes may be described by a Fourier Series or similar [*Advanced Engineering Mathematics*, 5th Ed., Erwin Kreysig, pub. John Wiley and Sons, ISBN 0-471-88941-5, Ch. 5.3, pp. 211–216], all of which are available to excite the antenna in many resonant modes additional to the 1/4-wave fundamental.

The Q of a circuit containing a spark gap has been seen to be a severe limiting factor on the performance of resonators generally (particularly high Q ones — however, any unwanted losses in a radiating circuit that do not contribute to the radiation are undesirable). Not only does the gap dissipate energy (that could otherwise be usefully employed in radiation), but in extinguishing at low currents it suppresses further oscillation in the antenna before all energy in the circuit has been usefully employed.

Finally, the top capacitance is used as the primary energy store in the two-circuit system. Available system energy is described by the equation  $E = 0.5CV^2$ . To maximize transmission power, this energy must be maximized. An obvious ploy to increase available energy is to increase the voltage (V), because not only does energy scale as voltage squared, but antenna capacitance must be kept low enough to enable working at a desired frequency with good radiation efficiency. The geometry of the electrode dictates the voltage it can be charged to, and high voltages demand a large radius of curvature for the energy storage capacitance. It is clear that there are limitations on increasing both capacitance and voltage in this system.

### Transmitter summary

In this transmitter, the sole resonant circuit is being asked to do two jobs with conflicting requirements. While



radiating efficiently, it is also required to achieve a high degree of harmonic suppression. The four-circuit system gets around this by separating these functions into two separate loosely coupled circuits, each performing a single function. Any circuit containing a spark gap has a very lossy harmonic generator built into it. Efficiency is not restricted to signal radiation alone, and the resonator (antenna) in this system is excited at a multitude of frequencies resulting in a wideband transmission. In the four-circuit transmitter, the gap is removed from the antenna circuit and incorporated into separate circuits, the degree of coupling between them defining the bandwidth of the circuit until the gap is quenched. Ideal quenching results in a single frequency output, a fact well known in early radio circles. This scheme, when used with close coupling, allows energy transfer from primary circuit to antenna to be effected with very few gap conductions ... and hence, losses.

The four-circuit system still suffers gap losses but enables the gap to be quenched (removed) from the antenna circuit while still allowing the antenna to ring at its natural frequency with better efficiency. The moment the gap stops conducting in the two-circuit system, all oscillations cease. There is a serious problem when trying to increase power in the system to a level suitable for long distance transmission. The requirements for the capacitor (u) to be small for radiation efficiency and large for energy storage clash badly. The voltage the capacitor can be charged to is limited by its size and shape — hence transmission power is also restricted. The four-circuit system overcomes this by allowing use of arbitrarily large primary storage capacitance charged to arbitrarily high voltages in a compact manner. Primary energy storage is removed from the aerial system.

**(3) Receiver characteristics.** The receiver circuit appears in Fig. 11 (Marconi Wireless Telegraph Company of America v. The United States, 81 Ct. Cls. At p. 677), shown in Fig. 2. Once again, a lossy element (coherer) appears in the antenna resonant circuit,

losing energy and widening the antenna frequency response. The degree of coupling between the two resonant circuits in the four-circuit system defines overall system response and removes the lossy coherer from the antenna.

With that technical evaluation of the two-circuit system as background, we can turn to two portions of the Supreme Court opinion that are sometimes cited as preserving Marconi's priority of invention.

First, a sentence in the majority opinion at page 37. The sentence reads: "Marconi's reputation as the man who first achieved successful radio transmission rests on his original patent, which became Re-issue No. 11,913, and which is not here in question." The pronoun "which" has an ambiguous antecedent. It is not clear whether the matter "not here in question" is Marconi's reputation, or the validity of the two-circuit patent, Re-issue No. 11,913. It appears to the writer that it refers to the latter, which was not in issue because neither party sought review of the Court of Claims decision on the reissue patent since there had been a finding of no infringement. But even if it refers to the former, the statement would have significance only if the combination by Marconi of the elements invented by others played an important role in the progress of radio; and as it has been shown above, it did not. The two-circuit system could only transmit a few miles without the Lodge improvement, which increased the range to 80 miles. In contrast, the four-circuit system could reach 6,000 miles and lessened interference of other transmitters. The two-circuit system transmitter was identical to that of Hertz. The receiver merely substituted a coherer — invented by Branly — in the Hertz receiver, in lieu of the spark gap used by Hertz for experimental purposes.

The second citation is to the dissenting opinion of Mr. Justice Frankfurter. He commenced his dissent by pointing out the inadequacy of lawyers, such as himself, to follow a technical discussion. 320 U.S. 63, footnote 1. It is clear that he found it difficult to understand

the facts, because he failed to cite a single one in support of his view that those prior in time to Marconi "did not have the 'flash' ... that begot the idea in Marconi which he gave to the world through the invention embodying the idea." Perhaps it was for this reason that he failed to persuade the majority. Just as in any other profession, lawyers and judges apply principles to facts to draw conclusions. The majority applied legal principles to facts and found that Tesla invented radio. Justice Frankfurter apparently reached the conclusion in his dissenting opinion in some other way.

Guglielmo Marconi deserves great credit for his vigorous promotion and business development of wireless telegraphy and radio, just as credit for promoting the polyphase alternating current system belongs to George Westinghouse — not the inventor, also Nikola Tesla.

Marconi evaluated the commercial opportunities arising from the inventions of Hertz and Tesla, and seized them. When Hulsmeier, the inventor of radar, tried to sell his invention to shipowners, he had no success. Being a shrewd businessman, Marconi tied his customers with contracts so tight in exclusive dealing arrangements that shipowners were fearful of dealing with others to install radar systems for safety purposes because the systems also used Hertzian waves. "The very fact that all reports and documents referred to Hulsmeier's [radar] discovery as based on a form of wireless telegraphy was enough to convince them [shipowners] that it was one and the same thing, however different its use, and shipping lines using wireless telegraphy in its accepted sense were mostly under contract to the Marconi monopoly. The terms of the Marconi License were strict and no one in those competitive times would dare risk a suit for breach of contract" [bracketed material added] (Pritchard, *The Radar War*, Thorsons Publishing Group, Wellingborough, Northamptonshire, NN8 2RQ, England, 1989, at p. 19).

Being a good businessman, Marconi

*Continued on page 57*



# Mt. Wilson Travelogue

*Join this private tour of one of America's most famous observatories.*

*Hams are a curious bunch. They have an interest in many things — particularly scientific ones. For this exploration a group of hams joined a group of nonhams for a total of 18 persons. The nonhams were primarily amateur machinists enjoying everything mechanical.*

**H**ams participating in this event were Norm K6YPD, Johnny WB6HYR, Tom N6DGK, Pat KA6TRK, Warren KE6LEA, John KM6JV, Hugh W6WTU, and Mike (call not available).

**Photo A** shows four of the hams posing for their picture. Photos were provided by Norm K6YPD, Hugh W6WTU, and Johnny WB6HYR, who

provided the majority of those shown here.

For this trip, we toured the Astronomy Observatory located on the top of Mt. Wilson (CA). The observatory is at 5,100 feet above sea level overlooking Los Angeles County. Warren KE6LEA made the arrangements for us to have a privately conducted tour of all the facilities.

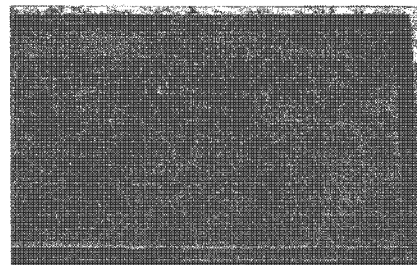
Mt. Wilson is named after Benjamin Davis Wilson who was a pioneer trapper and settler (see **Photo B**). He blazed a trail to the top of the mountain in 1864, after which the mountain was named Wilson Peak and later changed to Mt. Wilson.

Adjacent to the observatory is the site of all the TV transmitters serving Los Angeles County. Yes, this is RF Hill and our handheld radios did experience some desense from time to time. **Photo C** shows the density of the transmitting antennas located on the site.

While we were waiting in the parking lot for all of our tour group to arrive, we had a chance to investigate our surroundings. Located in the parking lot was a huge microwave horn that

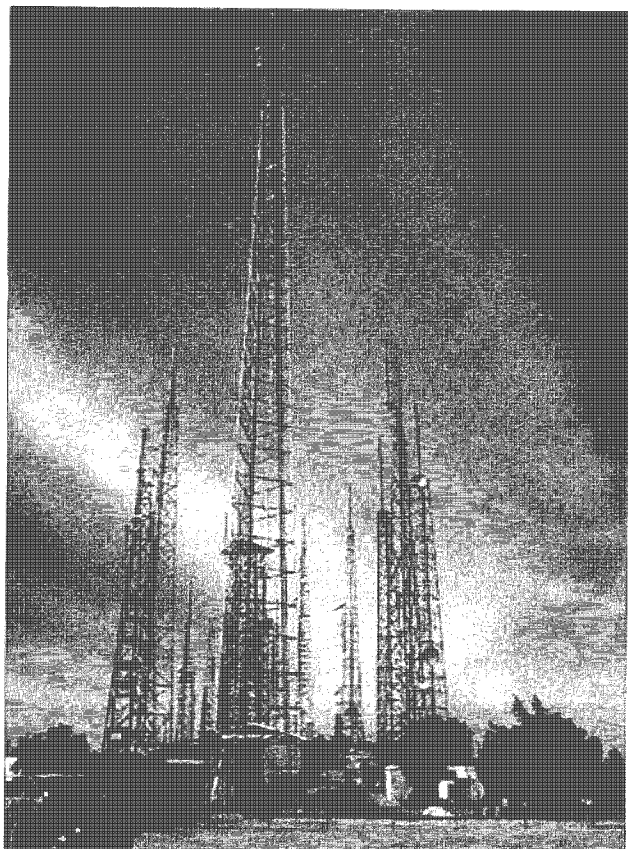


**Photo A.** Some of the hams participating in the visit. From L to R: Norm K6YPD, Hugh W6WTU, Tom N6DGK, John KM6JV.



**Photo B.** Bronze tablet erected for Benjamin D. Wilson.





**Photo C.** TV and FM broadcast antennas serving the Los Angeles metropolitan area.

appeared to have served its time and had been relegated to the parking lot for storage (**Photos D and E**). Although I didn't measure the waveguide dimension, I did estimate the circular guide dimension to be three inches in diameter. It is my estimate that the antenna was designed to support signals in the 3-GHz band.

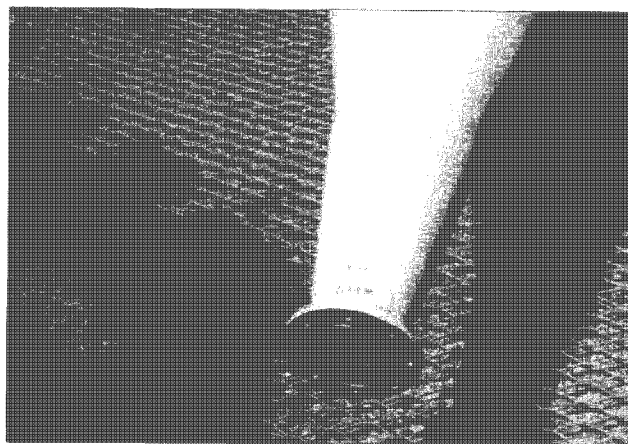
Although the radio equipment on the mountain was of interest and the TV antennas captured our attention, we were there to visit the observatory. Our tour docent for the visit was Don Nicholson (see **Photo F**), who had been associated with the observatory since he was a small child — his father worked on the site during the early years.

The word observatory might tend to lead you to believe that there is only a single observatory on the site, when in reality there are over eight. All are active and operated by astronomy research groups from all over the U.S. The reason for the congregation of

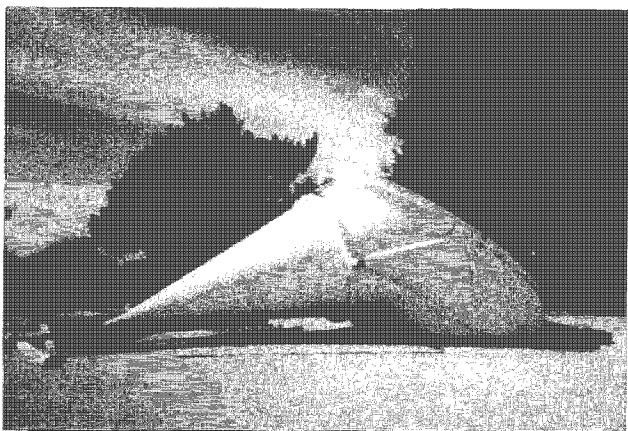
observatories is because the site is considered to be the "best seeing site" of anywhere in the U.S. At 5,100 feet, the telescopes are above the light field generated by the metropolitan area below and very little or no light aberration is experienced.

One interesting fact was brought out during the tour: For a great many years, astronomy was considered to be a "man's field" and women were not accepted as observers until the 1950s era.

One of the first "large" telescopes was a 60-inch parabolic reflecting



**Photo D.** Circular waveguide for the 3-GHz antenna.



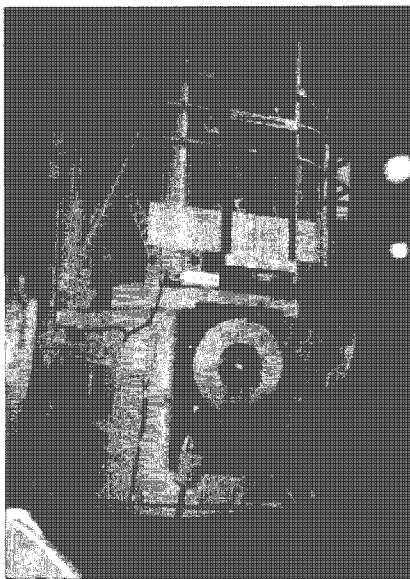
**Photo E.** 3-GHz waveguide horn antenna lying on its face in the parking lot.



**Photo F.** Don Nicholson leading the group for a tour of the Mt. Wilson observatory site.

scope and it was placed on Mt. Wilson (see **Photo G**). This particular telescope was one of the first designs providing mounts for both visual viewing lenses and for cameras. Several

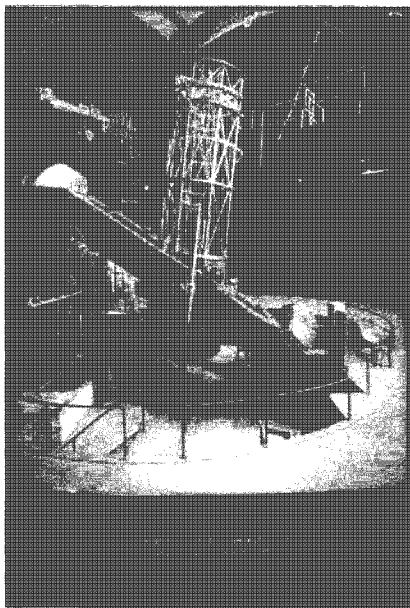




**Photo G.** Partial view of the 60-inch parabolic reflecting telescope located at the observatory on Mt. Wilson.

"second" mirror options were made available for installation on the upper portion of the structure to accommodate most any viewing requirement. Currently the 60-inch scope is the only one on the site that is available to the public for lease by the night.

In 1917, a 100-inch reflecting telescope



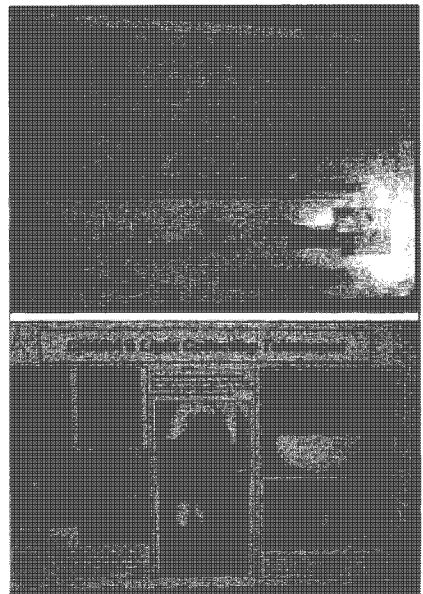
**Photo H.** The 100-inch Hooker telescope. Photographs made with this telescope can reveal stars so faint they are no brighter than an ordinary candle at a distance of 8,000 miles. Completed in 1917 and remained the largest of its kind for 30 years.

(**Photo H**) was developed and installed on Mt. Wilson following the design of the 60-inch. Years later a 200-inch telescope was built and installed at Mt. Palomar near San Diego.

One of the most recent telescope developments on the Mt. Wilson site was designed and is being built by Georgia State University and is called "The Chara Array" (see **Photo I**). I found this telescope to be very fascinating because it is the equivalent of a huge parabolic lens 350 meters in diameter creating a collimating image profile with an infinite focal length. The design utilizes six telescopes positioned in the form of the letter "Y" with two telescopes per leg. The telescopes in each leg are at different spacing to reduce or prevent a redundant image. All six scopes are linked together with evacuated light pipes with a resulting optical image accuracy within a fraction of a wavelength. "Viewing" from the Chara Array is performed by a computer.

Mt. Wilson has many historical events locked up in its closet, with the "secrets" being revealed only to those who venture into the realms of the observatory.

Here is one of the many historical events recorded for the site. During the 1924-1926 period Professor Albert A. Michelson measured the velocity of light from the Mt. Wilson site using a rotating mirror (see **Photo J**). The accuracy achieved was 4 km/s, and that was better than any previous measurement. The previous accuracy obtained by others in 1906 was 10 km/s. Michelson's record stood until 1950, when Esser in England achieved an accuracy of 3 km/s.



**Photo I.** Two photos of "The Chara Array." The lower photo shows some of the in-process pictures during construction.

To make the measurement, Michelson had a reflecting mirror placed 22 miles away on Mt. San Antonio, providing a total light path of 44 miles. Surveying teams verified the distance to an accuracy of a small part of a cm. After making the measurement, the joke became, "Now that we've measured the velocity of light, we question the length of the meter!"

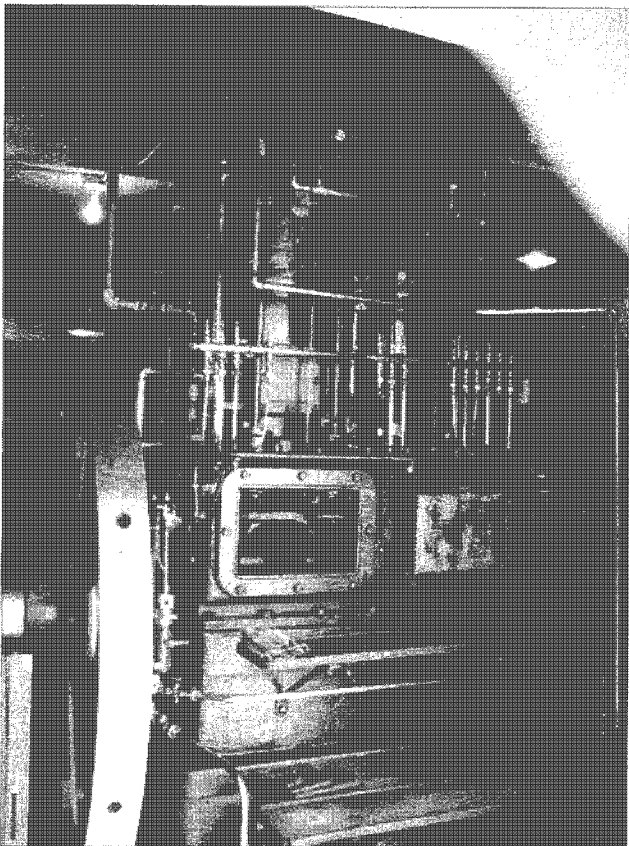
Michelson's rotating mirror was spun using compressed air, causing it to scream loudly. Michelson used a tuning fork as his "standard" for determining the speed of the mirror's rotation. By the way, the force of gravity was measured and recorded at the test site should gravity have an effect on light velocity.

Another aspect of the visit to Mt.



**Photo J.** Bronze tablet erected on the pier where Prof. Albert Michelson measured the velocity of light to an accuracy of 4 km/s.





**Photo K.** 1912 Fairbanks-Morse 2-cylinder 50 HP engine formally used to drive a 40 kW 120 VDC generator. Most all of the Mt. Wilson observatory equipment was powered by 120 VDC.

Wilson was the demonstration of a Fairbanks-Morse engine which had been installed in 1912 (see **Photo K**). At that time the observatory site was designed to run on 120 VDC. The Fairbanks-Morse engine drove a 40 kW DC generator (**Photo L**) that was used to charge a bank of batteries during daylight hours. The objective was to operate the observatory at night off of the batteries since the heat from the engine would create light aberrations.

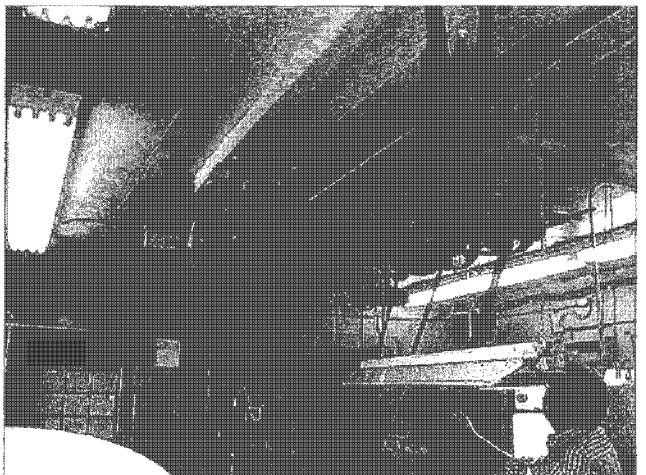
The engine had been dormant for about 35 years after AC power was provided to the mountaintop. However, the observatory continued to operate off of DC power, so a large bank of rectifiers was set up to take over the task and eliminate the batteries.

A volunteer group of three fellows decided to restore the Fairbanks-Morse engine during mid-1999 and it has been operating ever since. The engine is now operated for demonstrations only and it was a very fascinating thing to see and hear operate. The engine was designed to operate on any combustible fuel, but gasoline and kerosene was used mostly in this engine. Details on the engine are as follows:

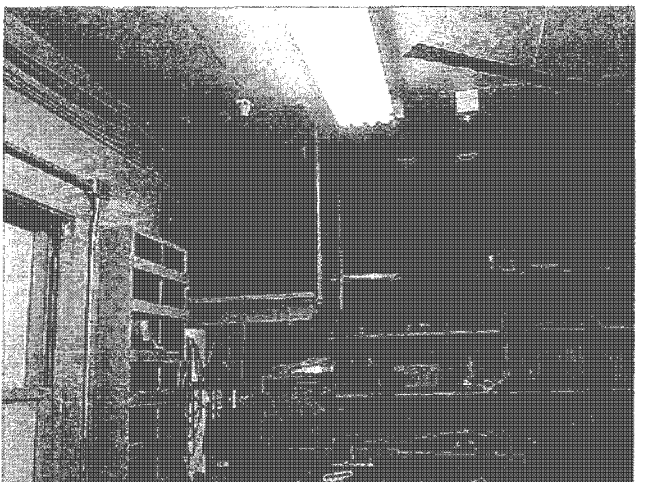
- 2 cylinders
- 25 HP per cylinder (total of 50 HP)
- Bore is 11 inches, stroke is 15 inches
- 300 rpm
- Shipping weight of 22,000 lbs.
- Two solid cast-iron flywheels at 1,700 lbs. each



**Photo L.** Picture of the 40 kW 120 VDC generator being driven by the 50 HP Fairbanks-Morse engine.

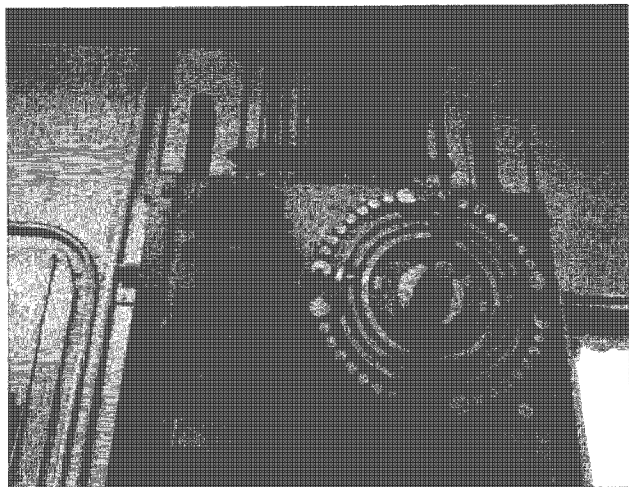


**Photo M.** The line-shaft used to distribute rotating mechanical power to various pieces of machine shop equipment.



**Photo N.** The 120 VDC line-shaft drive motor driving a belt and pulley speed reducer.





**Photo O.** Stepped switch rheostat and power solenoid used for controlling the line-shaft drive motor.



**Photo P.** Ham and machinist tour group entering the Astronomical Museum. Much of the history of Mt. Wilson and observed phenomena is displayed within.

- 8 feet of vertical height
- Displacement was estimated to be equivalent to seven times that of a small-block Chevrolet engine.

I stood beside the engine while it was running and the only noise that it made was the clicking of the external push rods that operated the valves and igniter points — quite an exhilarating treat! To create a spark within the cylinder, a set of mechanical points were mounted inside of each cylinder. At the appropriate time, the points open and a spark across the open points fires the fuel.

After standing beside the engine for a while and being fascinated by the smoothness and silence of operation, I went outside of the building to listen to the exhaust. The sound emanating from the exhaust stack was considerably

different from that heard from a typical gasoline engine. The best way for me to describe the sound is with a “hoof-hoof-hoof” instead of the sharp “crack” with each cylinder firing one hears from a gasoline engine.

Following the original installation of the engine on the observatory site, people living on the mountain were provided with hot water during the daytime. Cooling water for the engine, after passing through the engine, was routed through the local shower so that people could bathe in warm water. Apparently the engine provided the only hot water on the mountaintop during those early years.

Adjacent to the Fairbanks-Morse engine was the original machine shop servicing the observatory site. Most of the equipment is powered from a

line-shaft as shown in **Photo M.** A 120 VDC motor, shown in **Photo N.** drives the line-shaft. A rheostat, shown in **Photo O.** controls the motor's speed. Although most of the original line driven equipment is still operational, several independent pieces have been installed.

Although our first tour stop was in the Astronomical Museum, **Photo P.** it is being discussed last because of its importance to the visit. A multitude of photos adorn the walls of the museum, with each describing many of the observed sights and phenomena from our nighttime sky. Much of the history of Mt. Wilson and the observatory is recorded and displayed within the museum, revealing many of the secrets of things that happen above our head. One of the things of concern to hams, of course, are flares occurring on the sun, and the way they affect our signal propagation.

Even though this tour was not strictly ham-radio-oriented, the scientific history and development represented was very enlightening to many of us. Because of the volume of information available, I suspect that a second or third trip to the mountain will be necessary in order to gain a proper perspective of the things that are going on around us but are normally out of our daily sight.

73

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After continuously being turned on for 14 days (336 hours), it was possible to read a newspaper using only the output from this amazing system. This item sold out at Dayton!

**Say you saw it in 73!**



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the July issue, we should receive it by April 30. Provide a clear, concise summary of the essential details about your Calendar Event.*

## APR 13

**ST. PAUL, MN** The Robbinsdale ARC, Inc. (44 years old this year), will sponsor the 21st annual Midwinter Madness hobby electronics show at Ganglehoff Center on the Concordia University Campus in St. Paul MN, Saturday April 13th, 7:30 a.m. to 1 p.m. Concordia University is located off Interstate 94 near Hamline and Marshal. Super buys on computers, hardware, components, peripherals, and amateur radio equipment. Info, registration or tickets: 763-537-1722. Free parking. Same-day VE exams. Commercial Exhibitors. Large indoor swap meet. Admission is \$7 at the door. Children 12 and under admitted free. Advance discount tickets available at Amateur & Antique Radio Consignment Center. Pavak Museum, and Radio City. For more information visit [<http://www.visi.com/~k0ltc/>], or E-mail [[k0ltc@visi.com](mailto:k0ltc@visi.com)].

**WEST ORANGE, NJ** The IRAC Hamfest 2002 will be held by the Roseland Radio Club, IRAC, at West Orange High School, 600 Pleasant Valley Way, West Orange NJ, Saturday April 13th from 8 a.m. to 1 p.m. This event will feature amateur radio, computers, and things of interest to SWLers and electronics hobbyists. Plenty of free parking. Ground level access. This event will be held indoors rain or shine. Admission \$5 at the door (no advanced tickets). XYL/children under 12 free (with regular admission). Tables paid in advance are \$15 for the first and \$12 for each additional; or \$20 for the first and \$15 for each additional at the door. Add \$2 for the limited number of tables available with electric. You must RSVP by April 5th, after that, first come first served. Sellers ONLY admitted at 6:30 a.m. — no exceptions! Special parking lot for vendors. Talk-in on 146.415(+1.0) 85.4T, 447.875(-5.0) 156.7T, or 146.520 simplex, on the W2QR repeater system. Contact *Harvey Muskowitz W2YWC*, 973-994-0637. The Club Web page is at [[www.qsl.net/k2gqj](http://www.qsl.net/k2gqj)].

## APR 14

**RALEIGH, NC** The Raleigh ARS will present its 30th Hamfest and NC State ARRL Convention in the Jim Graham Bldg., NCS Fairgrounds, Sunday April 14th, 8 a.m. to 4 p.m. Wheelchair access. ARRL, MARS, ARES/NTS and QRP meetings are among the features of this event. All activities inside. Advance tickets are \$5 each, \$6 at the door.

Tables and booths are available. Free parking. RVs welcome. A Hospitality Party will be held Saturday night. VE exams W4VFJ, 919-556-8551. For pre-registration, general info and dealer inquiries, contact *Jeff Wittich AC4ZO*, 211 Dundalk Way, Cary NC 27511, tel. 919-362-4787.

**STOUGHTON, WI** The Madison Area Repeater Assn. will sponsor the Madison Swapfest Sunday, April 14th, at Mandt Community Center, Stoughton Junior Fair Grounds on South Fourth St. in Stoughton. Doors open at 8 a.m. Talk-in on 147.15. For further info see the Web site at [<http://www.qsl.net/mara/>], or call 608-245-8890. Tickets are \$4 in advance and \$5 at the door. Free parking. Send payments to *Madison Area Repeater Assn., P.O. Box 8890, Madison WI 53708-8890*.

## APR 20

**MORGANTON, NC** The 5th annual Catawba Valley Hamfest and Computer Fair will be held at the Burke County Fairgrounds, Hwy. 181 North, Saturday, April 20th, 8 a.m. to 4 p.m. The FCC's Riley Hollingsworth will speak. Vendor setup is Friday night and Saturday morning. Admission is \$4 in advance, \$5 at the gate. VE exams on site. For ticket info contact *Don Beam KK4NI*, tel. 828-652-3102, or E-mail [[dbeam@wnclink.com](mailto:dbeam@wnclink.com)]. For dealer info, contact *Larry Withrow AF4HX*, tel. 828-652-4195, E-mail [[af4hx@worldnet.att.net](mailto:af4hx@worldnet.att.net)]. Talk-in on 147.150(+)

## APR 26, 27, 28

**VISALIA, CA** The International DX Convention, sponsored by the Southern California DX Club, will be held at the Holiday Inn Plaza, 9000 W. Airport Dr. Features include DX forums/programs, vendors, Saturday banquet and Sunday breakfast with major DXpedition speakers. Admission is \$60 in advance, \$65 at the door. For more info see [[www.qsl.net/visalia2002](http://www.qsl.net/visalia2002)], or contact *Don Bostrom N6IC*, 4447 Atoll Ave., Sherman Oaks CA 91432. Tel. 818-784-2590; E-mail [[n6ic@arrl.net](mailto:n6ic@arrl.net)].

## APR 27

**SONOMA, CA** The Valley of the Moon ARC, W6AJF, will hold its annual ARRL Hamfest, Saturday April 27th, from 8 a.m. to noon. The hamfest will be held at the Sonoma Valley Veteran's Memorial Bldg., 126 First Street

West, Sonoma CA, just one block north of the central Sonoma Plaza. Follow Highway 12 which passes through the center of town in front of the Plaza. For a map and printed directions to the hamfest, send a business size SASE to *VOMARC, 358 Patten St., Sonoma CA 95476*. Talk-in will be on 145.35(-600) PL 88.5. For more info call *Darrel WD6BOR* at 707-996-4494. Admission is free and hams are encouraged to bring the entire family. The event will include a walk-in VE exam session with registration starting at 9 a.m. Testing for all license elements begins at 10 a.m. There will be an electronics swap meet with both indoor and outdoor spaces available. Setup will start at 7 a.m. Spaces rent for \$10 each; free of charge for amateur radio organizations to use for informational tables and displays. The Club will serve a full breakfast from 8 a.m. to 10 a.m., including eggs, pancakes, sausage, juice and coffee or tea for \$5. Demonstrations include an operating QRP station, AMSAT, a display of home-brew equipment, and a beginner's RDF transmitter hunt. VOMARC members will be on hand to help visiting hams register with the FCC through the Universal Licensing System so they can renew licenses and upgrade. VOMARC will also be participating in the QRP to the Field contest, which will run during the hamfest. Guest operators are cordially invited to sit in and take a turn operating the Club station.

## APR 28

**ARTHUR, IL** The Moultrie Amateur Radio Klub will hold their 40th annual Hamfest 8 a.m. to 12 p.m. on April 28th, at the Moultrie/Douglas County Fair Grounds on the south side of Arthur, just off of Illinois Route 133, behind the high school. Talk-in will be on 146.055/655 and 449.275/444.275. Admission \$5 per person over the age of 14 years. Tables are \$10 each, paid in advance. To reserve tables, or for info, write to *M.A.R.K., P.O. Box 91, Lovington IL 61937*, or call for info during the day at 217-543-2178, evenings at 217-873-5287.

**CANFIELD, OH** The Twenty Over Nine ARC Inc., of Youngstown OH, will host its 18th Annual Hamfest 8 a.m. to 2 p.m., Sunday April 28th at Mahoning County Career and Technical Center (formerly J.V.S.), 7300 N. Palmyra Rd., Canfield OH. Gate admission is \$5, children

*Continued on page 57*



## MAROC-TUBSAT

*On January 22nd, an E-mail went out to the AMSAT-BB remailer from Colin Hurst VK5HI, asking if anyone was aware of an amateur satellite with a beacon on 144.1 MHz. This began a series of fact-finding efforts by hams around the world to identify the mystery signals.*

During the following 24 hours, many theories were posted until it became apparent that we had a new satellite operating within the Amateur Satellite Service frequency spectrum that was not a hamsat. MAROC-TUBSAT was on the air.

### ZENIT-2 launches five satellites

On December 10, 2001, a Russian Zenit-2 rocket lofted five satellites into a 1,000-km (540 miles) orbit from the Baikonur

Cosmodrome in Kazakhstan. The primary payload was the 5,000-pound Meteor-3M meteorological observation (weather) satellite. Mounted on a ring around the base of Meteor were four much smaller satellites including Kompas, Reflector, BADR 2, and MAROC-TUBSAT. The orbit is circular and sun-synchronous, with an inclination to the equator of 99.7 degrees.

Kompas is a 175-pound geophysics satellite designed to help with earthquake predictions. Reflector is a curious satellite built

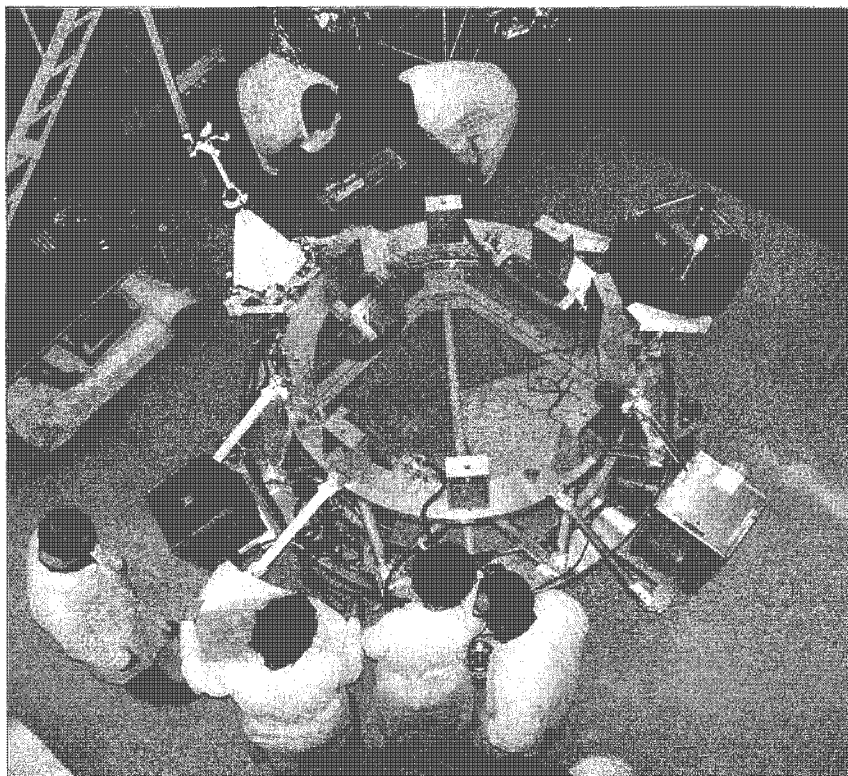
by NII KP in Russia under contract to the U. S. Air Force Research Lab at Kirtland Air Force Base in New Mexico. It is 4.5 feet long, 1.5 feet wide, weighs 13 pounds, and carries an array of laser retroreflectors. The satellite has four triangular fins on a square base with a deployable boom. Its purpose is to provide a resource for calibrating Air Force imaging systems and other optical sensors that are used to monitor "space junk."

The remaining two satellites, BADR 2 and MAROC-TUBSAT, were considered potential candidates for the signals heard on 144.1 MHz. The groups behind both satellites have a history of successful satellites that have used amateur-radio frequencies.

BADR 2 was built by SUPARCO (Space and Upper Atmosphere Research Commission) in Karachi, Pakistan, and SIL (Space Innovations Limited) of the United Kingdom. In Pakistan it is known as Badar-B. The satellite weighs 150 pounds and contains a number of experiments including magnetorquers, a gravity-gradient boom, radiation detectors, a CCD (charge-coupled device) camera, and communications systems on VHF, UHF, and S-band. BADR 1 (Badar-1), the first satellite from SUPARCO, was launched several years ago. It had uplinks on 435.030 and 435.512 MHz. The downlinks were on 145.825 and 144.025 MHz. It was a 26-facet polyhedron shape weighing 115 pounds. Its signals on the two-meter band alarmed many hams since there was no apparent amateur-radio connection with the Endeavor. Fortunately it did not last long, only about a month.

### A German-Moroccan satellite

MAROC-TUBSAT weighs in at 104 pounds and was built for Morocco's Royal Center for Remote Sensing by the German



*Photo A. MAROC-TUBSAT, Reflector, BADR 2, and Kompas are arranged around the periphery of the ZENIT-2 adapter ring prior to the December 10, 2001, launch from Kazakhstan. (TUB photo)*



Technical University of Berlin (TUB). The basic structure is derived from the TUBSAT-C spaceframe. The satellite is the first for Morocco and the CRDTS (Moroccan Royal Center of Space Teledetection). CRDTS is directed by Driss El-Haddani and has been active since 1989. The Technical University of Berlin, however, has had previous successful satellites, some using amateur-radio frequencies.

The primary mission of MAROC-TUBSAT is Earth remote sensing and vegetation detection from space. The camera resolution is 300 meters. Attitude control is provided by gyro assemblies in orthogonal axes coupled to a star sensor and sun sensor. Magnetic field sensors are also used.

Additional systems are incorporated for store-and-forward digital communications. The satellite has VHF, UHF, and S-band transmitters. MAROC-TUBSAT was identified by Ray Soifer W2RS as the source of the 144.1 MHz transmissions from space. The satellite was transmitting FSK (Frequency Shift Keying) CW as VVV DE CN/ ZARKAA AL YAMAMA. CN is the ITU (International Telecommunications Union) prefix for Morocco.

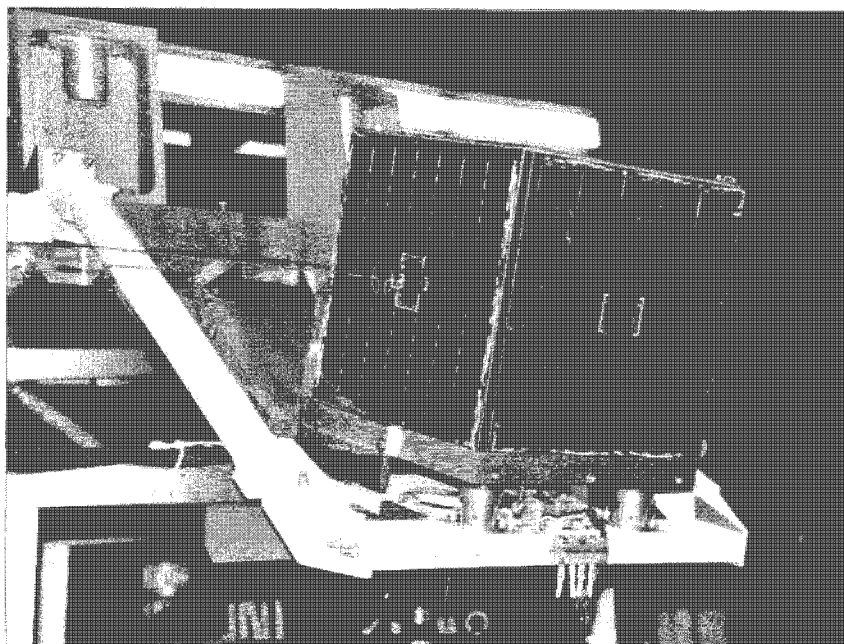
Another frequency associated with MAROC-TUBSAT was noted at 436.075 MHz when the satellite was over Europe and Africa. Although the S-band transmitter is supposedly on 2208 MHz, no reports of reception were mentioned in January.

On Friday, January 11, 2002, Morocco's King Mohammed VI personally congratulated the Moroccan university professors responsible for design of the experiments on MAROC-TUBSAT. Morocco now joins Egypt and Saudi Arabia in a small group of Arab-Moslem nations with earth-orbiting satellites.

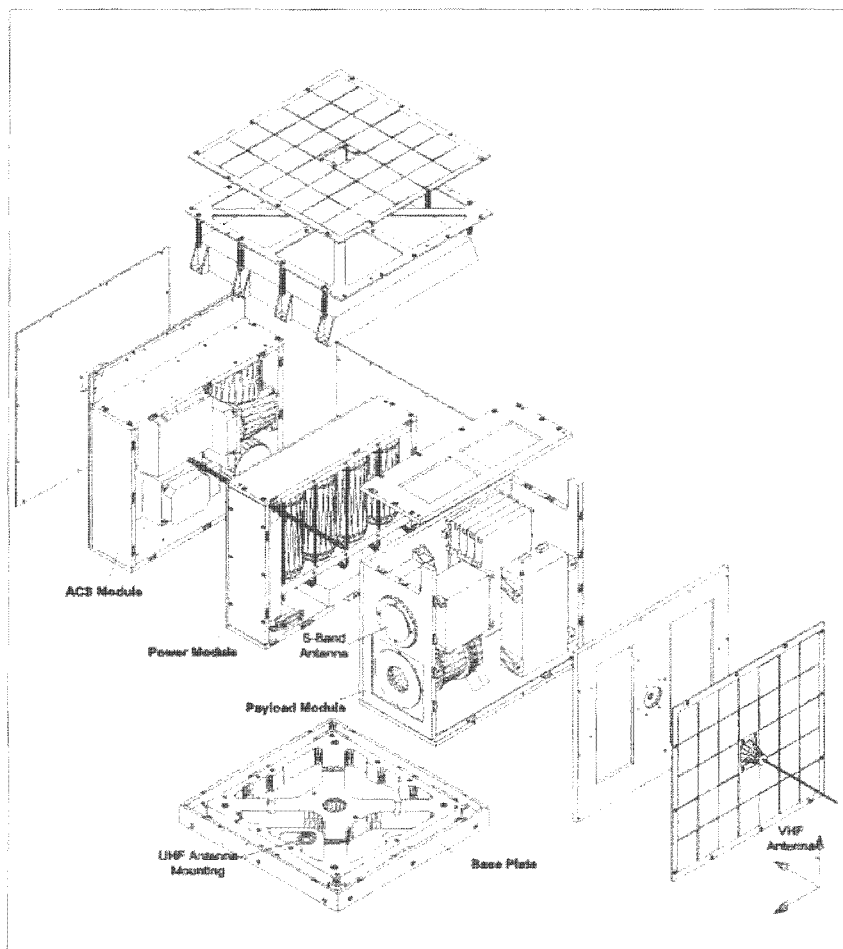
Less than two weeks later, Norbert Nothoff DF5DP, representing DARC, the German version of the American Radio Relay League, was in contact with some of these same professors to find out more about the incursion into the two-meter Amateur Satellite Service band. IARU (International Amateur Radio Union) Satellite Advisor Hans van de Groenendaal ZS6AKV was also establishing contacts to the Moroccan National Radio Society (ARRAM) to ask for more information about MAROC-TUBSAT.

Shortly after the excitement died down, the two-meter signals from MAROC-TUBSAT were off the air, and the other ham-band operations on 436.075 MHz and 13 cm were in question. Talks are continuing.

*Continued on page 58*



*Photo B. MAROC-TUBSAT was built as a cooperative effort between groups in Morocco and Germany with communications gear on Amateur Satellite Service frequencies. (TUB photo)*



*Fig. 1. Exploded drawing view of MAROC-TUBSAT from the Technical University of Berlin (TUB).*



## Freebie Antenna Aid

*There are a lot of programs available to the ham these days, and most of us pay tribute primarily to those communications programs that have changed the face of ham radio. And this is rightly so, because that is the big news. But there are a few other valuable contributions that might fall unnoticed if we don't make some fuss over them.*

The other day I was looking at one of the fine pieces of software from the library of free ham software. This was MMTTY. Ever since its release it has been a hit not only with the newcomer to RTTY — many old-timers have converted to its ease of use, excellent quality, cost (free), and dependability. Hard to beat.

The author, Makoto (Mako) Mori JE3HHT, has written another noteworthy communications program, MMSSTV, also freeware and of equally excellent quality. Many praises have been pronounced by users and columnists for both of the above programs.

However, Mako has two other ham programs to his credit that you very seldom hear about. One is his DSP audio filter, which works quite well with the soundcard, and another, MMANA, is a full-featured antenna design analyzer.

I know I tread on thin ice with some of you when I bring anything into this column that does not send and receive musical tunes via the soundcard while displaying message print on the monitor. But please bear with me a few minutes. Mako addresses a real issue here and he understands it well. You see, he was inspired to put forth this effort because of his own needs, and since it worked for him, he is sharing it with the rest of us.

As modern-day hams (especially in the USA) you are experiencing two factors that barely existed 20 years ago. We used to be pretty lucky in that we could erect some reasonable structure to support a decent antenna as long as we had an average city lot or larger piece of real estate surrounding our residence.

As most hams are painfully aware, that is the exception these days, unless you live a fair distance outside the city limits. My

case is a bit enviable in that I have had chunks of aluminum and wire sticking up for so long that it is somewhat tolerated in my neighborhood. That could change anytime, and then I could join the ranks of those with "stealth" antennas.

The other factor, which is a good thing, is the advent of the digital modes that is permitting exceedingly dependable communications at power levels which are typically ten percent of those we used to consider "average." I converse with hams frequently who are running 25 watts or less to attic antennas, and it is tough to maintain a consistent readable signal between the two factors of low power and the limited radiator. Don't get me wrong. Hams by their very nature are happy to communicate. It is simply a bonus when the adversity of antenna restrictions can be overcome with a few inexpensive adjustments.

To be perfectly honest, there is no common solution for this attic antenna dilemma, but what is needed is to do whatever is possible to make that crazy antenna into the best radiator possible. That is why I am spending a bit of time this month waving the flag for MMANA.

Before I go too far, I have to admit that I am as lazy as anyone. If I can put up a full-size antenna, either commercially built or copied from a handbook, that is what I do. Further, if I find I can load a chunk of wire to the point my transmitter is happy and I get consistent decent reports, I don't try to invent new wheels.

Additionally, these days there are some really neat commercial antenna analyzers on the market, and those who are in the know are using them. Sometimes I feel I suffered a slight misfortune from living in the days of the dip-meter (I still have one and break it out on occasion). These are

more difficult and time-consuming to use, and users tell me I have to be nuts not to at least put the dipper away and buy one of the new-fangled tells-all gadgets. Saves hours, they tell me. But there are more ways to skin the kitty. Some of us are old-fashioned.

Be all that as it may, the best success will be had if you can design and cut your limited-space antenna and feedline to the best possible dimensions. From there, whatever you do to adjust the SWR should become minimal and your success over the air will be much improved.

Bearing these facts in mind, a trip to the HamSoft MMTTY Web site to download the MMANA software can prove educational at the very least. Mako is right up front, as he explains that the program with all its instructions is not intended to be a course in design. He mentions a few pieces of recommended reading; unfortunately for most of us, those how-to references are in Japanese.

Do not let this little detail stop you. There are quite a few published works on antenna design readily available. I have several from the ARRL, and there are others on the shelves. Some of my reference material is just as old as the dip-meter I mentioned earlier. And, something to remember: If the principles were correct thirty years ago, they are not too far off these days. I will admit, however, that I still learn things about these strange radiating devices when I keep my eyes and ears open. It doesn't mean there are new principles; they may simply be old principles explained in a different light.

### Getting started

Refer to The Chart for the MMTTY Web site. If you don't already have your copies



of MMTTY and MMSSTV, check them out. Then explore the DSP filter and, for sure, download the MMANA software. It isn't real big — less than a megabyte.

Install the program, then take a look at the folder/directory where the program is installed and bring up and print two files, Enman.txt and Eppen.txt. You can display these from the Help button, but I had no luck in printing them from there, so I imported them to my word processor and printing was a snap from there. They are 15 to 20 pages each. I prefer hard copy for files that length.

Unless you are already an antenna engineer (I am not), these files will not be fully understandable. You do need this information. Then you will discover several things as you read the text files. The first is at the very end of one of the files: The author of the program lives in an apartment in Japan and is in about the same antenna predicament as many of you. In fact, he appears to have about as much space for antennas as someone living in a hotel.

Thus, one of the driving factors behind building an antenna analyzer program was optimizing his own meager "antenna farm." As I was reading through the text files, I found references to models Mako had stored for different types of antennas. He did a lot of experimenting, and the results will be of interest.

The file I brought up from the subdirectory included in the program is for a Windom antenna to load on 80, 40, 20, and 10 meters. The view in Fig. 1 is only one of four panels available for that antenna model. You will find other panes available as you click on the tabs above the display. This allows you to alter and recalculate the properties of your antenna to see what is most likely to work.

This Windom antenna appears to be an attempt at a radiator to fit in a limited space and not necessarily the optimum design to be installed down on the farm. His instructions for the use of the program give a lot of glimpses into the best ways to use the program and, in the process, a few tips about how some parts of the antenna work.

After you experiment with this for a while, you will hopefully get "hooked" and find it necessary to break out those antenna design books you have had lying around and put something together that really works regardless of what kind of space you have to work within. Personally, I have several projects I have been putting off, mostly because of the time-consuming what-if math necessary, and that is all made much easier with a program such as this one. And you will like the price.

## Back to operating systems

You may not keep as many ham applications in your computer as I have here. The latest count is about 20 ham applications plus the various word processing and graphics necessities used to compile these columns. Each of these programs, especially the ham software, deserves credit for making computers useful.

All of these programs worked well in versions of Windows prior to the Millennium Edition (Me) that came with this new computer. I have just a few more programs to try, and the next order of business will be to save these files to a CD, format the hard drive, and install Win98se.

I talked to the service folks at the computer manufacturer and they warn me that I will void the warranty on the machine in so doing. That's really tough; the only problems with this computer have been caused by the Me operating system, and the manufacturer of the equipment simply throws up its hands when asked for help. Been on my own all the way anyway.

By the way, I receive a lot of mail concerning my ranting about Me. Most folks agree, and some offer suggestions — which

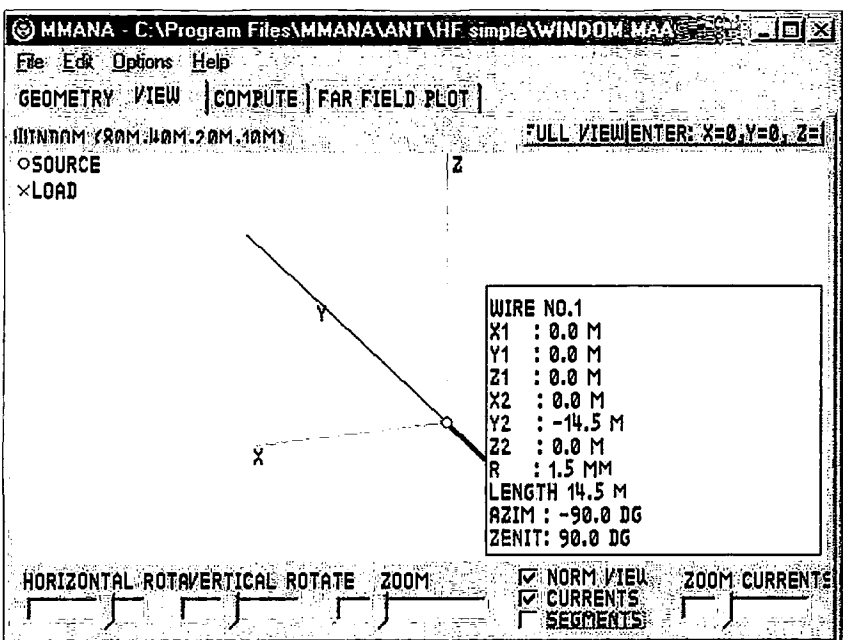
I appreciate. I occasionally receive messages where my use of the language must fail and it appears I am saying certain software has failed me under this operating system due to a defect in the programming.

I never want to leave that impression. All the software I mention in this column works and has been written by hams for the express purpose of advancing the technology. It is all good software. Please do not read negative thoughts into the message that would indicate disapproval of the programs reviewed. It is only the operating system (Me) with which I am at odds.

One other note on the operating system dilemma. I heard a rumor the other day that there are two new systems on the drawing board to replace the XP already. Hard to understand. What are the programmers to do? Just imagine all the free alterations necessary to keep our ham computers playing their magic tunes. When Microsoft is in charge of the music, your guess is as good as mine.

## Linux

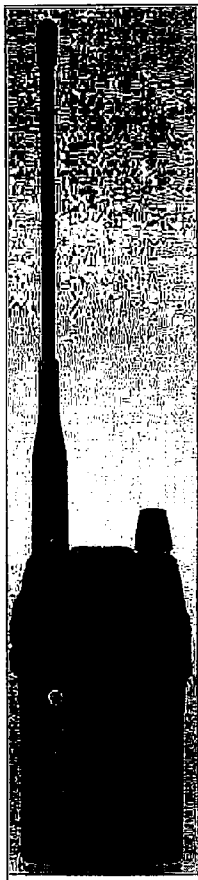
Speaking of operating systems, I mentioned last month that I intended to install Linux in the old slow machine that this current



**Fig. 1. Screenshot** — Here is just one of the panels available in the MMANA free antenna analyzer available from the author of the MMTTY and MMSSTV programs. With today's limitations and restrictions on ham antenna location, you need all the help you can get to radiate a decent signal from the many stealth locations, especially attics, that hams are forced to use. This program can help you make the calculations necessary to turn these tough conditions around in your favor. The program comes with a lot of good information concerning operation of the software. You will still need some good basic fundamentals in antenna design principles. The author of this program developed it because he faces the same restricted space problems as many US hams.



# NEW PRODUCTS



## Aiinco's DJ-S40T Pocket HT "Second Generation" Pocket-Size UHF Transceiver

Alinco has introduced the DJ-S40T UHF HT, a pager-size transceiver that replaces the very popular Alinco DJ-S41. The new model has several improvements over the original and can transmit with up to 1-watt output with the optional Ni-MH battery or external DC power. Announcement of the new unit was made by Craig Cota of ATOC Amateur Distributing, which distributes Alinco products to dealers in the USA and Canada.

The new DJ-S40T has a "normal" output of 500 mW, 100 memories, a call channel, several scan modes, and more. It covers the entire U.S. UHF amateur radio allocation of 420-450 MHz, with receiving capabilities beyond the allocated transmission range.

Unique features include a newly designed case that conceals the speaker but provides loud, clear audio. The antenna is now a standard SMA fitting. There are 38 CTCSS encode and decode settings (decode included as a standard feature) and four tone bursts that make the unit usable for repeater operations in many parts of the world.

The large illuminated display is easy to read and provides information to the user about a number of useful features. Alinco has added its experimental "mosquito repelling feature" to the unit along with a theft alarm function and the ability to clone units by cable. There's also an external power port.

Many Alinco accessories, such as a wide variety of speaker mics and power cables, are cross-compatible with the DJ-S40T.

In addition to normal simplex and repeater operations, a very popular application of the tiny transceiver could be its use through cross-band transceivers, essentially using the DJ-S40 as a "remote mic" through a base or mobile dual-band transceiver.

The MSRP for the DJ-S40 is \$109.50, but dealers often set "street prices" below the suggested retail.

"The DJ-S40T demonstrates Alinco's continuing leadership in the development of small-sized, high performance, low-cost transceivers," says Mr. Cota. "The DJ-S41 proved there is a market for pocket transceivers and that most areas served by repeater systems do not require high power in order to achieve reliable communications. The DJ-S40 is an exciting 'next step' in the evolution of small-size, full-featured radios that are fun and affordable."

## NEVER SAY DIE

*continued from page 7*

Ollie North was being interrogated by a senate committee. He was asked by a senator why he spent \$60,000 on a security system for his house. Ollie said it was to protect him and his family from a terrorist.

"Terrorist? What terrorist could possibly scare you that much?"

"His name is Osama bin Laden, sir," Ollie replied.

The senator tried to repeat the name, but couldn't pronounce it, to snickers from the audience.

"Why are you so afraid of this man?" the senator asked.

"Because, sir, he is the most evil person alive that I know of," Ollie answered.

"And what do you recommend we do with him?" asked the senator.

"Well, sir, if it were up to me, I would recommend that an assassin team be formed to eliminate him and his men from the face of the earth."

The senator disagreed with this approach.

The senator was, of course, Al Gore.

## Why Hams Are Not Building

I hear complaints on the air and in letters that hams don't build like they used to. News flash: Hams have never built "like they used to." Hams have, in general, never bothered to build anything they could buy commercially. Early hams built their own receivers — up until the day after the

first commercial ham receiver was announced. When I was a kid in Brooklyn I roller skated around town, visiting almost every active ham and I found only one out of over a hundred who'd built his own receiver. Nut case. Sure, we built our own rigs, but we had to — there weren't any commercially built transmitters available. And when the contraptions we built didn't work we took 'em over to Cy W2IXY so he could find out where we'd gone wrong. His only piece of test equipment was a neon bulb. Hey, I haven't seen any of those 110V neon bulbs in years.

In those days I could go to Cortlandt Street and shop for parts, or to Canal Street, over on Sixth Avenue, to Radio, Wire, Television (later named

Lafayette Radio). Wow, did they have parts! Radio stores with acres of parts tables are long gone.

Heath and Eico came along with kits, which made building a snap. We didn't even have to make our own holes for tubes. Now they're gone. We still have Ramsey and MFJ doing a good business in kits. And it is fun to build your own stuff and to tell visitors, "I built it myself."

But the idea of building some of today's complicated rigs is discouraging. I suspect that one of the reasons Heath folded was that equipment was just getting too complex. I remember George Morrow, who came out with a bunch of state-of-the-art computer

*Continued on page 59*



whiz-bang system replaced. Done that. And that is a continuing learning process. Several Linux users (hams, remotely located) warned I should get a local guru to stand over my shoulder to get the setup up and running.

Local Linux gurus are not readily available, at least around this corner of the shire. If they are here, they are burrowed into their hobbit holes so deeply that they will not see daylight until the week after I have this project conquered. And this is one project that looks as if I can work on it for a long time and never really feel proficient enough to come to someone else's aid.

The reason, I am finding, is there are so many versions of Linux out there. What

cures I have found listed and published by other new users have not applied here because of those differences. That is one more reason there is so little help for the newbie: The would-be helpers don't wish to embarrass themselves in new territory.

So, here is where it stands at this stage of the game. I installed the Red Hat version 7.2, which is said to be one of the easier installations. To obtain direction on this installation, I went down to the local book supermarket and culled through many feet of bookshelf space lined with books on Linux. I purchased the thickest one I found and digested several chapters on installation before proceeding.

The big, thick (over 2 inches) book did

pretty well. I am finding the advantage is that the book came with three CDs. Two of them have the installation files and the third one has documentation that if I ever printed it, would likely fill one of my bookshelves and run over onto the floor. As a little aside, I have noticed that Microsoft's documentation for Windows 2000 Professional (over \$200 worth of books) is quite lengthy also. These are both systems primarily engineered to operate networks. The similarity ends there.

Linux is a take-off on Unix and is a whale of a system for networking. That isn't what I am after of course. The interest in this shack lies in the fact there are about a half dozen ham programs written for Linux. And they are soundcard programs similar to the ones we are seeing written for Windows.

The real interest I have is in seeing what the operating system can do in my shack. I thought this system would run well on an old slow computer such as the 120 MHz CPU with 32 megs of RAM that it is residing in at this time. Well, that situation is answered with a yes and a no. Yes, it will run, but if I implement the Windows-style desktop, it runs like a snail.

So I experimented. By the way, on the initial installation the system started up okay but ran like a snail with a broken leg. After a bit of research, I decided that the swap file I had allotted was a wee mite small and had to reconfigure. After that, I found I could get reasonable performance from the desktop until I demanded too much from it, such as running the Netscape program that came with it at the same time.

On with the experimenting. I found I could escape the desktop, bring up one of the available shells, and run Netscape on its own and the speed was acceptable. Further probing showed that the dialer, which I could only seem to activate under the desktop, would stay awake after exiting the desktop. Amazing what you can do with a little tinkering.

These conditions made it possible to dial up my ISP and download three Linux PSK programs from the G3VFP site listed in The Chart. I felt like I had conquered this thing by then. I hate to admit the number of hours it took to get to that point, but it is possible for someone, regardless of skill level, to exercise persistence and get into the Linux and make it work.

Now I have only to get the soundcard to cooperate, learn the decompression and installation techniques, and run a few cables, and we may see this thing on the air. Just a

Source for:	Web address (URL):
Mix W Soundcard program for PSK31, RTTY, new modes, MTTY, FSK31, more	<a href="http://tav.kiev.ua/~nick/my_ham_soft.htm">http://tav.kiev.ua/~nick/my_ham_soft.htm</a> <a href="http://users.nais.com/~jaffejm/mixwpage.htm">http://users.nais.com/~jaffejm/mixwpage.htm</a>
MMTTY RTTY soundcard freeware	<a href="http://www.geocities.com/mmtty_rtty/">http://www.geocities.com/mmtty_rtty/</a>
TrueTTY — Sound card RTTY w/ PSK31	<a href="http://www.dxsoft.com/mtrtty.htm">www.dxsoft.com/mtrtty.htm</a>
Pasokon SSTV programs & hardware	<a href="http://www.ultranet.com/~sstv/lite.html">www.ultranet.com/~sstv/lite.html</a>
PSK31 — Free — and much PSK info	<a href="http://aintel.bi.edu/es/psk31.html">http://aintel.bi.edu/es/psk31.html</a>
Interface for digital - rigs to computers	<a href="http://www.westmountainradio.com/RIGblaster.htm">www.westmountainradio.com/RIGblaster.htm</a>
Soundcard interface info — includes Alinco	<a href="http://www.packetradio.com/psk31.htm">www.packetradio.com/psk31.htm</a>
interface info for DIY digital hams	<a href="http://www.qsl.net/wm2u/interface.html">www.qsl.net/wm2u/interface.html</a>
WinWarbler info and free download	<a href="http://www.qsl.net/winwarbler/">www.qsl.net/winwarbler/</a>
MFSK — related tech info — how it works	<a href="http://www.qsl.net/z11bpu/">www.qsl.net/z11bpu/</a>
Throb — New — lots of info	<a href="http://www.lsear.freeseerve.co.uk/">www.lsear.freeseerve.co.uk/</a> <a href="http://www.blintern.net/~g3vfp/">www.blintern.net/~g3vfp/</a>
Download Logger, also Zakanaka	<a href="http://www.geocities.com/kc4elo/">www.geocities.com/kc4elo/</a>
PSKGNR — Front end for PSK31	<a href="http://www.at-williams.com/wd5gnr/pskgnr.htm">www.at-williams.com/wd5gnr/pskgnr.htm</a>
Digipan — PSK31 — easy to use — new version 1.6	<a href="http://members.home.com/hteller/digipan/">http://members.home.com/hteller/digipan/</a>
TAPR — Lots of info	<a href="http://www.tapr.org">www.tapr.org</a>
TNC to radio wiring help	<a href="http://freeweb.pdq.net/medcall/ztx/">http://freeweb.pdq.net/medcall/ztx/</a>
ChromaPIX and ChromaSound DSP software	<a href="http://www.siliconpixels.com">www.siliconpixels.com</a>
Timewave DSP & AEA (prev.) products	<a href="http://www.timewave.com">www.timewave.com</a>
Auto tuner and other kits	<a href="http://www.fdgelectronics.com">www.fdgelectronics.com</a>
XPWare — TNC software with sample DL	<a href="http://www.goodnet.com/~gjohnson/">www.goodnet.com/~gjohnson/</a>
RCKRtty Windows program with free DL	<a href="http://www.rckrtty.de/">http://www.rckrtty.de/</a>
HF serial modem plans & RTTY & Pactor	<a href="http://home.att.net/~k7szl/">http://home.att.net/~k7szl/</a>
SV2AGW free Win95 programs	<a href="http://www.raag.org/index1.htm">www.raag.org/index1.htm</a>
Source for BayPac BP-2M & APRS	<a href="http://www.tigertronics.com/">www.tigertronics.com/</a>
Int'l Visual Communication Assn. — nonprofit org. dedicated to SSTV	<a href="http://www.mindspring.com/~sstv/">www.mindspring.com/~sstv/</a>
Hellschreiber & MT63 & MFSK16 (Stream)	<a href="http://t2bby.syonline.it">http://t2bby.syonline.it</a>
HamScope — multimode w/ MFSK16	<a href="http://users.mesatop.com/~ghansen/">http://users.mesatop.com/~ghansen/</a>
YPLog shareware log — rig control — free demo	<a href="http://www.nucleus.com/~field/">www.nucleus.com/~field/</a>

Table 1. The Chart.



## A Wake-up Call

*The terrorists who attacked the United States last September succeeded in having an impact. We see this every time we travel through an airport. Did they also deal a crippling blow to amateur radio?*

You may have read in the newspaper or in one of the ham magazines that there is a proposal to establish an emergency communications service somewhat along the lines of the National Guard. The idea is that this group could be called to duty to provide communications in an emergency. Proponents of this plan have pointed out that normal communications may fail during an emergency, so there is the need for alternative communications. America needs to have a reliable source to which it can turn to provide this service quickly when needed. One idea is to establish this technology-based service, equip it with appropriate radios, train the communicators and have them ready, willing, and able to respond if and when needed.

I don't know about you, but reading about this new service seemed like reading an ad in the help wanted section, and for my own job. Isn't this what amateur radio is supposed to do? Of course it is! If we have a group that already provides this service, why are we talking about establishing a similar service? If we have a group of trained communicators who not only provide a service but also bring their own equipment at no cost, why do we need to re-invent the wheel with this new service?

Because the right people don't know we exist. That's why! To many people, ham radio is just a hobby. It is something like CB. It's something that a bunch of old men do. It messes up televisions and lowers property values with big ugly antennas. Generally people don't see amateur radio as a valuable service that is there to provide communications in an emergency. They only see a quirky hobby.

There are two main reasons that this occurs. First, one of the effects of peaceful times is that there is a comfort level, and that comfort level is partially due to ignorance.

Ignorance is not stupidity — it merely means that people are not aware of the facts. When you feel secure and your telephone works and your cell phone is reliable, it is natural to not even think that backup systems may be required to be used someday under some conditions, somehow. How often do you think about your smoke detector if it is not sounding an alarm or requiring a battery change? Probably never. Amateur radio is in the same boat.

Second, we hams have become just as complacent as everyone else. We may get some publicity from time to time, but much of that is relatively innocuous. Do you read every news story in your daily newspaper? Of course not. So why should we believe that everyone would devour the article on page 9 about ham radio? While many of these are quite good, they tend not to grab other people's attention. If they highlight ham radio support for a disaster, the very people we need to see the article are often too busy worrying about the disaster itself rather than our contribution to it. Besides, while the general public is important, it is *more* important to get our message in front of the real decision-makers.

If it is believed that amateur radio cannot or will not be a primary provider of emergency communications, one of the primary reasons for amateur radio's very existence is eliminated. The frequencies that we have been loaned may be necessary for other purposes, and amateur radio could cease to exist. Trying to operate a ham radio would be viewed the same as trying to drive a horse and buggy down the interstate: out-of-date strange behavior that might no longer be legal.

Get involved! Really involved! Do you have an Amateur Radio Emergency Services (ARES) or Radio Amateur Civil Emergency Services (RACES) identification card? Do

you have a grab-and-go kit of essential materials you'd need in an emergency? Do you regularly check into the local emergency net? If not, it's time to start.

We need to demonstrate to the people who matter that we can AND WE WILL be there, ready to provide communications services when needed and for as long as needed. When the National Guard was tasked with ensuring additional security at the nation's airports, they accepted the mission. They will carry out that mission until relieved of it. That is the level of support that our nation now needs.

Times have changed. No longer are we talking about three days of support after a storm strikes. We need to demonstrate that we can and will provide emergency communications when called upon until that need no longer exists. It may be time to more closely coordinate our efforts with civil defense and public service agencies. It may also mean we have to define methods for providing extended operations if called upon to do so. Does your ARES, RACES, or club group have a plan to do so? If not, I propose that every amateur radio group get a commitment from every member to provide at least four hours' support per week if necessary. Develop a schedule to show how the hams in your city could provide around-the-clock coverage on an ongoing basis if called upon to serve. I think that most of us are convinced that we have the equipment and the ability. What we need to demonstrate is that we will have the endurance as well.

The other thing that we need to do is to let the right people know what we are capable of and committed to. The human-interest story on ham radio in the local newspaper is nice and ego-gratifying but does

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# HOMING IN

Radio Direction Finding

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## USA's Foxhunters Take On the World

*Every year, more and more hams discover the fun of hidden transmitter hunting, either in cars (called T-hunting and bunny hunting) or on foot (called foxtailing, radio-orienteering and ARDF). For those who prefer searching for transmitters while on the run, 2002 brings the opportunity to compete against fellow hams both at home and abroad.*

Is there any doubt that on-foot transmitter hunting under international rules is the fastest growing form of ham radio contesting? It combines adventure, intrigue and exercise with an activity that's suitable for hams and nonhams of almost any age. The best radio-orienteers are physically fit, mentally alert, and technically adept. If you're looking for a way to hook your children, grandchildren, nieces, and nephews on amateur radio, this activity may be your answer.



**Photo A.** Even if you're not ready for the championships, you can have radio-orienteering fun in a park near you. Why not volunteer to put on a foxhunt for your radio club this spring? In this photo, Art Jury KF7GD takes his young "navigator" along on a two-meter hunt in southern California. (Photos by Joe Moell)

This spring, why not hold some easy in-the-park transmitter hunts to get local hams and their offspring going (**Photo A**). Then you can progress to international-rules hunts on both eighty and two meters. For ideas on equipment and rules for simple hunts like this, see the "Homing In" Web site and previous "Homing In" columns.<sup>1,2</sup>

### ARDF in the Appalachians

For over 20 years, hams in Europe have staged national and multinational events to crown the best on-foot foxhunters. Last year, for the first time, USA had its own national championships, hosted by the Albuquerque Amateur Radio Club.<sup>3,4</sup> Competitors came from ten states, including groups from several metropolitan areas such as Los Angeles, Denver, Atlanta, Cincinnati, and Raleigh. Afterwards, I had no trouble finding individuals and clubs from these locations who were eager to host the next one. After much discussion, the nod was given to the Georgia Orienteering Club (GAOC).

Because of its importance in the selection process for USA's team to the ARDF World Championships (more on that later), USA's national championships must take place in the spring this year. GAOC proposed a simple one-weekend competition schedule that would minimize expenses and away-from-work time for ARDFers who wish to attend both of 2002's major radio-orienteering events.

The Second USA ARDF Championships will be held on April 19–21, 2002, at F. D. Roosevelt State Park near Pine Mountain, Georgia. The competition gets under way on Friday afternoon with a practice event, followed on Saturday by the main two-meter hunt, and on Sunday by the 80-meter hunt. In addition to the hunts, there will be a

cookout on Friday evening, a spaghetti dinner on Saturday night, and an award ceremony following the 80-meter hunt.

Competitors are divided into five categories for males and four categories for females, in accordance with newly approved ARDF rules of the International Amateur Radio Union (IARU) (**Photo B**). There will be awards for the first-, second-, and third-place finishers in each category. Foreign visitors are welcome and encouraged to



**Photo B.** Think you're too old for ARDF? There's a special category for men over 60, and there will be lots of competitors in that category at the USA and World Championships. This is Bob Cooley KF6VSE, a medal-winner in classic orienteering who now takes to the trails with radio gear. The set he's holding is for the 80-meter band.



come and compete. Awards will be presented in two divisions, Overall and USA-Only.

Pine Mountain is approximately 90 minutes southwest of Atlanta. There are many local motels and bed-and-breakfast inns nearby, because the town is adjacent to Callaway Gardens, a 14,000-acre resort. If you're pinching pennies or if you just like to rough it, there are cabins in the park and campgrounds with RV hookups.

Laurie Searle KG4FDM of GAOC is the Meet Director. Her husband Sam Smith N4MAP (Photo C) is the ARDF course-setter. Both have years of experience hosting classic (non-radio) orienteering meets. Sam won a silver medal at the First USA ARDF Championships in Albuquerque.

Whether you're an expert or you've never finished a formal radio-orienteering course before, the USA's ARDF Championships are open to you. The deadline for registering is April 6. If that's already passed by the time you read this, it may still be possible to attend, so contact the organizers right away.

The easiest way to register for the Pine Mountain events is via the GAOC Web site, where you will find the event flyer, rules, and information about an E-mail notification list. Registration forms are available for download. You can get there by link from the "Homing In" site. If you're not on the Internet, write to GAOC's Registrar, Robin Shannonhouse, 4738 City View Drive, Forest Park GA 30297.

Be sure to allow an extra day before or after the Championships for a visit to Callaway Gardens, which is famous for its nature trails, flower gardens, butterfly center, birds of prey show, and much more. You can play golf, ride a bike, go fly-fishing, or shoot clay targets. If the ARDF action has worn you out, just sit and enjoy the flowers and the music from the Memorial Chapel.

### Tracking in the Tatras

Later this year, the USA takes on the world once again as Team USA travels to Slovakia for the Eleventh World Championships (WCs) of ARDF. This will be the third time that Americans have participated in the WCs. In September 1998, a group of five stateside hams went to Nyiregyhaza, Hungary, to compete and observe.<sup>5</sup> Then, in October 2000, a dozen from seven states made the journey to Nanjing, China, as the WCs took place in Asia for the first time.<sup>6</sup>

The Slovak Amateur Radio Association (SARA) is hosting the championships. The site is Tatranske Matliare in the High Tatras of the Slovak Republic, at about 3,000 feet



*Photo C. Sam Smith N4MAP of Georgia Orienteering Club sets the timers on his 80-meter fox transmitters at a practice session before the Championships in New Mexico last year. He will set courses for the Second USA ARDF Championships in Pine Mountain.*

in elevation. It's about 240 miles east of Prague and 125 miles north of Budapest. The terrain is mostly forested.

As most Americans celebrate Labor Day on September 2, Team USA members will touch down in Europe, travel to either Poprad or Kosice in Slovakia by air or rail, and then be transported by the organizers to the host town. They can stay at one of two fine hotels (Hutník and Metalurg) that are being completely taken over for this event. If they choose the hotel package, the registration fee for the entire championships, including events, lodging and meals, is 300 US dollars per person.

Alternately, participants can get a half-price package that does not include room and board. They will camp and cook in a nearby park, providing their own shelter and food. In either case, they have access to the facilities that include a gymnasium, swimming pool, fitness center, and game room.

On Tuesday, September 3rd, the Slovaks will host ARDF training events on both bands, followed by a gala Opening Ceremony. These ceremonies traditionally include a parade of the competitors, entertainment, and welcome by local dignitaries.

Wednesday starts early as competitors board buses to be taken to an undisclosed location for the big transmitter hunt on two meters. Thursday is a day of rest, with an

optional cultural program. Friday is the 80-meter hunt in a different venue, followed by the Closing Ceremony and a mini-hamfest. Everyone heads for home on Saturday morning.

Competitors are divided into the same age/gender categories as in Pine Mountain. Each country may have a maximum of three persons per category on its team.

If the 2002 ARDF World Championships are typical, there will be a total of about 250 competitors from 25 European and Asian nations. The "big guns" of the contest will be all the eastern European and former Soviet Union countries, plus China and Germany. We're still "little pistols," but that just means that we learn lots more when we attend, and we learn from the best.

Team USA members are responsible for their own transportation expenses to and from Slovakia. Entry fees are due in full to the organizers by July 15, 2002. ARRL will handle the wire transfer of funds, but it is not known yet if there will be any financial support from ARRL.

As ARRL's ARDF Coordinator, I have submitted the USA's Letter of Intent to Participate to the Slovakian organizers in accordance with IARU procedures. Twelve stateside foxhunters with current ages from 11 to 60 have already expressed strong

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## HOMING IN

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interest in attending. But it's not too late to put in your name for Team USA consideration.

Our categories for males between 40 and 59 years of age (as of 12/31/02) already have three or more signups, but more are welcome. Team USA selection in "overlooked" categories will be based on recent performances and standings in formal events such as last year's USA ARDF Championships in Albuquerque and this year's USA ARDF Championships near Atlanta. The divisions for males under 40 and for all females still have openings as of this writing, so it may be possible for inexperienced radio-orientees in these categories to join the team (**Photo D**). It is also possible to attend as a non-competing visitor, but our visitors must be listed as such on the national team roster and fees paid via ARRL.

If you are interested in traveling to the 2002 ARDF World Championships as a member of Team USA or as a USA visitor, please contact me immediately. If you have not been on Team USA before, include your full name and mailing address, callsign,

home phone number, and date of birth. You must be an American citizen or have resident status in this country. Also, visit the "Homing In" Web site, where you can read the latest news of Team USA formation plus stories and photos of previous Team USA trips, to give you an idea of what to expect.

If you wish to participate as a citizen of another North or South American country, contact IARU Region 2 ARDF Coordinator Dale Hunt WB6BYU by E-mail to [wb6byu@arrl.net] or by USPS to P.O. Box 108, Carlton OR 97111. Canadians should also contact RAC ARDF Coordinator Perry Creighton VA7PC by E-mailing [va7pc@rac.ca] or writing to 3018 Spring Bay Road, Victoria BC V8N 1Z3.

The World Championships of Amateur Radio Direction Finding (ARDF) take place only in even-numbered years, so you won't have another opportunity to compete in the WCs until 2004. I'm waiting to hear from you.

### Other opportunities

Traveling to overseas events is a great way to learn ARDF techniques from the best and

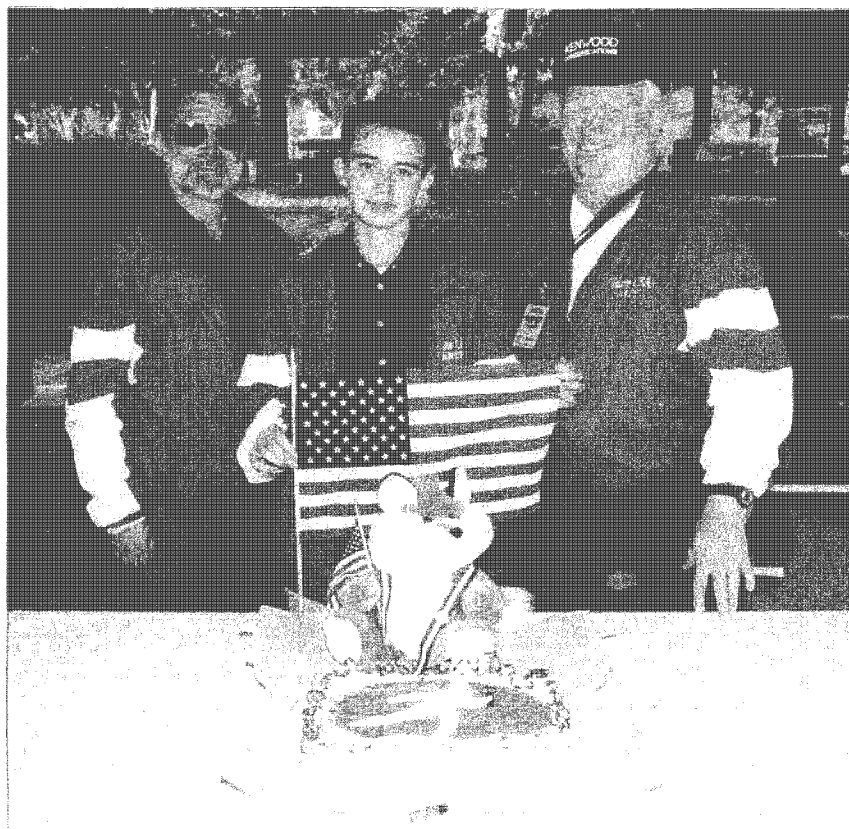
most experienced practitioners. If you can't go to Slovakia in September but want an overseas radio-orienting experience, look for announcements of other high-profile events where visitors are welcome. For instance, about 150 competitors from all over Europe are expected for the Ukrainian International ARDF Championships, 26 April through 1 May in Kiev, the capital city.

This year's national ARDF championships of Belgium are 8-9 June in Arlon, which is located in the southeast part of the country, close to the borders of France and Luxembourg. For boys and girls born in 1987 or later, the Third European Youth Amateur Radio Direction Finding Championships are 10-14 June in Nessebar, Bulgaria, on the Black Sea coast. Links to Web sites for each of these meets are at the "Homing In" Web site.

Thanks to all who are sending me stories and photos of your local RDF contesting activities, both in vehicles and on foot. Keep them coming by E-mail or postal mail to the addresses at the beginning of this article.

### Footnotes

1. Moell, Joe, "Homing In: Radio Foxes Don't Howl," 73 Magazine, March 1998.
2. Moell, Joe, "Homing In: ARDF is Off and Running," 73 Magazine, June 1998.
3. Moell, Joe, "Homing In: ARDF Championships Part 1 — Triumph in the Land of Enchantment," 73 Magazine, December 2001.
4. Moell, Joe, "Homing In: ARDF Championships Part 2 — The World Comes to Duke City," 73 Magazine, January 2002.
5. Moell, Joe, "Homing In: A Banner Year — More to Come," 73 Magazine, January 1999.
6. Moell, Joe, "Homing In: A New Millennium for Foxhunting," 73 Magazine, January 2001.



**Photo D.** Jay Thompson W6JAY was 15 years old when he traveled with his dad Richard WA6NOL (right) to the 2000 ARDF World Championships in China. Afterwards, they and Team USA member Marvin Johnston KE6HTS (left) were honored at this park hunt near their home.

If you're a No-Code Tech, and you're having fun operating, tell us about it! Other No-Code Techs will enjoy reading about your adventures in ham radio—and we'll pay you for your articles. Yes, lots of nice clear photos, please. Call Joyce Sawtelle at 800-274-7373 to get a copy of "How to Write for 73 Magazine."



## Does Your Junk Box Runneth Over?

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does work, but the amount of time consumed usually takes the "desire" out of constructing a project. Of course, you may be the type so easily frustrated by the confused parts storage that you'll run down to the local "candy store" to obtain the desired part, knowing full well that a supply of them exists in the junk box.

Another technique for storing things is shown in **Photo B**, where everything

is piled in the open so that you can find the "thing" by scanning the shelf. Yes, the amount of time required to locate the needed item is reduced, but the "pile" of stuff must still be handled to retrieve the desired piece. Stacking large pieces on the shelf works reasonably well for some items, but how do you handle small electronic parts? Over the years, the size of an electronic part has shrunk from "huge" to micro-miniature. The smaller the part, the better your organization must be to keep from losing the item. Do you store your junk box parts in coffee

cans or shoe boxes? Maybe you use old paint cans, trash bags, or cardboard boxes. Whichever method is used, there has to be a technique available for retrieval. One of my friends uses glass canning jars for storing small parts. Perhaps you recall the "Mason jar" that had a wide mouth and a screw-on lid. These jars make an excellent storage medium for items that can be identified visually by scanning the jar's contents. In most cases, the jar lids are secured to the underside of a shelf so that the jar can be easily viewed and retrieved should it contain the desired part. Jars are well suited for the organization and storage of nuts, bolts, and other small hardware items.

A technique that I started using when I was a youngster was to place parts in cigar boxes as shown in **Photo C**. Yes, when I was a kid, cigar boxes were readily available for the asking — and I accumulated a lot of them. Believe it or not, some of my boxes are so old that they

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NPN Transistors							
2N333	2.5 MHz	45V	25mA	150mW	B = 18	TO-5	—
2N706	320 MHz	25V	10mA	300mW	B = 20	—	—
2N1306 germanium	10 MHz	25V	300mA	150mW	B = 60-300	TO-5	NTE101
2N2222	250 MHz	60V	800mA	500mW	B = 50-120	TO-18	—
2N3055	10 kHz	100V	15A	115W	B = 20-70	TO-3	NTE181
BFR90	5 GHz	15V	—	—	—	—	NTE65
2SA490	1 GHz	30V	—	—	—	TO-72	NTE128
2SC535	800 MHz	35V	—	—	—	TO-92	NTE107
2SC1906	1 GHz	30V	—	—	—	TO-92 ECB	NTE107
PNP Transistors							
2N107 germanium	—	12V	10mA	50mW	B = 19	in-line	—
2N155 germanium	—	30V	3A	1.5W	B = 30	TO-3	—
2N247	30 MHz	35V	10mA	80mW	—	—	—
2N1038 germanium	8 MHz	40V	3A	1W	B = 20-60	—	—
A55	250 MHz	40V	—	—	—	TO-92 EBC	NTE100
A56	550 MHz	30V	—	—	—	TO-92 EBC	NTE160
2SA124	250 MHz	75V	—	—	—	TO-18 EBC	NTE126
FETs							
40600 Ndepl MOS	200 MHz	20V	18mA	400mW	—	5 dBm	MFE122
2N2843 Pdepl MOS	—	30V	2mA	300mW	1.4k $\mu$ mho	—	—
2N3819 Ndepl MOS	400 MHz	40V	20mA	—	5k $\mu$ mho	4 dBm	—
2N4416 Ndepl	400 MHz	30V	15mA	310mW	6k $\mu$ mho	4 dBm 150 rds	TO-72
3N163 Penhan	—	40V	50mA	375mW	250 $\mu$ mho	250 rds	—

**Table 2.** Example of data listings for transistors and FETs. The listing contains data pertinent to part identification and general usage.

IC Database	
4011	MOS quad 2-in NAND
4012	MOS dual 4-in NAND
4023	MOS triple 3-in NAND
4049	MOS hex invert
7400	quad 2-in NAND
7410	triple 3-in NAND
7414	hex Schmitt trig/invert
74LS14	hex Schmitt trig/invert
7432	quad 2-in OR
7433	open collector quad 2-in NOR
7442	BCD-DEC decoder
7447	BCD-7 segment decoder
7472	AND-gated J-K master-slave flip-flop
7483	4-bit binary full adder
7490	decade counter
74121	monostable one-shot
74123	dual retrigger mono 10145
74C150	CMOS 1-16 data select
74164	8-bit shift reg

**Table 3.** Example of an IC data file. Data provides a function reference associated with a part number.



## Does Your Junk Box Runneth Over?

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are worth more to a collector than the financial value of the parts they contain.

Obtaining authentic "cigar boxes" today is a lot more difficult than it was when I was a kid. But available today are pencil boxes that resemble cigar boxes in size and shape. In the Los Angeles area at least, pencil boxes show up on the shelves about one to two months preceding a school year. Whenever I see them, I manage to carry home several because I always have a "need to organize" my stuff in boxes the size of cigar boxes.

In my situation, each cigar box carries a sticky label that identifies the parts contained within. In the case of resistors or capacitors, the label carries a part's value range. Dividing the parts into numbered ranges reduces the "hunting" time required to retrieve a desired part. Of course, separating the resistors and capacitors into wattage size or working voltage increases the number of boxes required and does make it easier to find the "right part" for a project.

With technology driving down component size, small plastic drawers in cabinets provide an excellent storage medium as shown in **Photo D**. Each drawer carries a sticky label that identifies the contents. Because the cabinets are easily stacked, they are very convenient for tight storage spaces.

OK, now that you have your parts organized and you think that you can find them, what part do you need for a project? Let me cite an example of what happened to me once that caused me to consider a refinement to my parts organization. While cleaning up my workbench one day, I picked up a small flashlight bulb — yes, it was a good one and I recognized its application. But what didn't appear in my head was the technical information you would desire to have for that particular light bulb. Was it a 1.2 V, 2.5 V, 3.8 V, or perhaps a 6 V bulb? When I considered the fact that I failed to have the specific data in my head for the bulb I began to realize that I had no

information for other parts such as transistors, ICs, and other small parts that I use in my projects.

### Data control

To resolve the issue of readily identifying data for the light bulb, I began to build a database for every light bulb in my possession. A sample of the listing that I developed is shown in **Table 1**. The objective was to provide data that would be desired for use in any application in addition to the application for which it was designed. To make the light bulb listing meaningful, I've included only the pertinent technical data. Of importance to me was the part number, voltage, current, hours of life, bead color (for visual identification), base information, and alternate part number. The alternate part number allows me to obtain the bulb from my local "candy store" should that be necessary.

After completing the light bulb database, I continued to build up data on all of my transistors as shown in **Table 2**. Desired data for transistors follows a similar pattern as that for light bulbs. In most cases, I need to know the part number, maximum operational frequency, collector voltage, current, wattage dissipation, HFE (B), and an equivalent part number. With that information in mind, I can design a circuit using available parts or can easily relate one transistor to another anytime I choose. Being able to compare transistors is helpful when having to select a substitute device while repairing a piece of equipment.

Most transistors available today are processed in silicon or exotic materials, while those made earlier were made using germanium. I've found it interesting to identify and work with germanium devices because of the electrical differences they exhibit. Therefore, it's important to note "germanium" in my listing.

Field-effect transistors have so many unique characteristics that place them into a category of their own. The kind of FET information important to me is shown in the listing example. In addition to the normal voltage, current, and power dissipation, I've attempted to in-

clude the characteristics such as enhancement or depletion mode, micro mhos, noise figure, and saturation resistance that are appropriate for the device.

**Table 3** shows a brief listing for IC data. Since available data books carry the technical information you need for a circuit design, my listing objective was to provide functional identification. When designing a circuit out of your junk box, the listing allows specific parts to be selected for the project by function. Specific design data is then obtainable for that part from data book references.

After building up the various databases for parts stored in my junk box, I found a need for organizing the data. As shown in **Photo E**, I have file folders identified for the general type of data contained. Also shown in **Photo E** is a file folder marked *SPEC BOOK INDEX* which contains, in order, the data information shown in the bound books shown in **Photo F**.

An aspect of the database that has helped me is the fact that the only parts that are listed are parts stored in my "junk box." As a result, there is no reason to guess and search for a part, because if it's listed, it's properly filed in my junk box for easy retrieval.

### Conclusion

So what's a "junk box" and how can you best make use of one? Perhaps it's a bunch of accumulated trash, or it could be useful ham-related items having a value other than financial, that value being determined by the owner of the items in relation to the knowledge of an application usage. Using a transistor as an example, the value lies in knowing what the device is capable of doing, or how it will respond to a circuit stimulus. The device is useless unless its characteristics are known. Also, is the part contained in the junk box and is it available for use?

Your junk box is really a very personal thing — one that another person may not relate to or evaluate in the same manner as you. How you determine the value of your junk box is really up to you, but one thing's for sure: The better organized it is, the more fun — and valuable — it becomes. 73



## New Life for a Pierson KE-93


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and a mixture of dish detergent and water. Immediately after scrubbing, I wiped off all of the moisture with a paper towel. Although the dirt and grime were removed, the original dark color of the casting remained.

Cleaning the cabinet was much easier, because without electronics it was washed with detergent and rinsed with a garden hose. After drying the cabinet in the sun, I waxed the gray hammertone finish with auto wax and polished it with a soft rag.

### Conclusion

Working with the Pierson KE-93 communications receiver was quite an experience for me. The design of the receiver exceeded my anticipated performance criteria that I'd considered normal for tubed receivers of the 1950s era. The narrow bandwidth, low intermod, no identifiable images, and high sensitivity of the receiver were very impressive indeed.

On the downside, however, the compact design, though great for both mobile and base applications, makes the receiver very difficult to troubleshoot and repair. For troubleshooting purposes, a complete schematic would be very helpful, but in the absence of a schematic, I'm hopeful that the information that I've provided will assist you in restoring your own KE-93. 

## Tesla: Inventor of Radio and Modern-Day AC

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recognized the business advantages of a claim to invention of the products and services he was marketing as a check on his competition. In those days, most monopolies were formed by merging or buying up the competition, or by driving smaller competitors out of business through costly patent litigation where possible. Today, this is referred to by antitrust lawyers as nonprice predation and considered to be a restraint of trade.

For example, Edison had joined The


Gramme Electrical Company in 1882, a group formed expressly not only to fix prices but also to engage in patent litigation against "outside" electric companies (*Electrical Review*, May 15, 1882). The Sherman Act was not enacted until 1890. It outlawed price fixing and other restraints of trade (but by 1890, the business was already pretty well concentrated). In sum, evidence available from historical documents simply does not support Marconi's claim of invention, but shows only a strong incentive for claiming invention.

Marconi's interest in wireless transmission of intelligence did not commence until 1894.

In 1866, an American dentist named Mahlon Loomis showed that one could detect signals between two mountains in Virginia. Loomis applied for and was granted a patent for wireless telegraphy in 1872, some 22 years before Marconi learned of Hertz's experiments.

In 1897, Marconi could only reach a distance of nine miles. Two years later, he sent messages across the English Channel (the English Channel is about 22 miles in width from Dover to Calais) (Bruno, *The Tradition of Technology*, Library of Congress, Washington, 1995, pp. 110, 241).

In contrast, despite a laboratory fire in 1895 that destroyed most of his equipment, less than two years later Tesla was transmitting from his Houston Street laboratory in New York City a distance of 30 miles up the Hudson River to West Point (*Nikola Tesla On His Work With Alternating Currents*, N. Tesla, ed. L.I. Anderson, Sun Publishing, 1992).

Tesla was so confident of his new four-circuit system that in 1899 he wrote a letter to his friend Robert Underwood Johnson proclaiming "how ... absolutely sure I am that I shall transmit a message [across the Atlantic] to the Paris Exposition without wire ...!" (microfilm letter, Tesla to Robert U. Johnson, August 16, 1899, Library of Congress). 

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## CALENDAR EVENTS

continued from page 43

under 12 admitted free with adult admission. Mobile check-ins and directions until noon on 147.315 and 443.225, backup 145.275. Free parking. Handicap facilities available. Outdoor flea market spaces \$2 per 10 ft section. Inside tables \$10 per table, gate admission not included. Dealer/flea market setup at 6:30 a.m. Inside tables guaranteed until 9 a.m. with reservation fee in advance; others first come, first served. Dealer registration with SASE and check or MO payable to: 20/9 Amateur Radio Club, Inc., 55 S. Whitney Ave., Youngstown OH 44509. Payment must be received no later than April 15th. For more info contact Don Stoddard N8LNE, Chairman, 55 S. Whitney Ave., Youngstown OH 44509, tel. 330-793-7072, E-mail [N8LNE1@neo.rr.com]; or Rich Hamaker, Co-Chairman, 4939 E. Radio Rd., Youngstown OH 44515, tel. 330-792-4019. Uniformed and plain clothes security will be present. Alcoholic beverages, fire arms, and questionable or demoralizing materials are not permitted on school property.

**GALVA, IL** The Area Amateur Radio Operators club will hold the 3rd annual W9YPS/AA9RO Hamfest "ARRO Fest 2002" on April 28th, 8 a.m. to 2 p.m. at the Galva National Guard Armory. Handicap parking and handicap accessible. Excellent parking. Large outside flea market area. Electricity is available inside the building; bring your own extension cords. VE exams by reservation only. The National Guard Auxiliary will provide an All-U-Can-Eat breakfast as well as lunch. Advance tickets are \$5 with three stubs, \$7 at the door with one stub. To reserve tables and tickets, or to receive more info, contact Matt Bullock, 419 E. College St., Kewanee IL 61443, [mbullock@bwsys.net]; or Phil Imes, 908 Zang Ave., Kewanee IL 61443, E-mail [kewphil@cin.net].

### MAY 4, 5

**ABILENE, TX** The Key City ARC will sponsor its 17th annual Hamfest at the Abilene Civic Center from 8 a.m. to 5 p.m. Saturday, and from 9 a.m. to 2 p.m. Sunday. Free parking. VE exams. Wheelchair access. Limited RV parking for a nominal fee. Tables \$7 each. Pre-registration \$7 (must be received by April 29th), \$8 at the door. Talk-in on 146.160/.760. For reservations and info, contact Peg Richard KA4UPA, 1442 Lakeside Dr., Abilene TX 79602, tel. 915-672-8889. E-mail [ka4upa@arrl.net].

### MAY 11

**RENO, NV** The Reno Area Metro Simplex ARC will sponsor the Reno Spring Ham Swap at the KNPB Television Station, 1670 N. Virginia St. (on the campus of the University of Nevada, Reno), from 7 a.m. to 1 p.m. From



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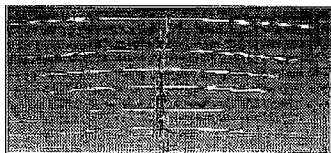


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## SPECIAL EVENTS, ETC.

**APR 13, 14**

### GODALMING, SURREY, UNITED KINGDOM

A worldwide radio link-up will be on the air Saturday April 13th and Sunday April 14th, the 90th anniversary of the sinking of the *Titanic*. The link-up is being organized by the Titanic Wireless Commemorative Group in co-operation with Godalming Museum, to honor the memory of Jack Phillips, Chief Wireless Telegraphist aboard the *Titanic*. Jack Phillips was 25 years old when he stayed at his post on the *Titanic*, sending out SOS distress signals in Morse code to alert other ships. He saved over 700 lives before he went down with the ship 2 hours and 40 minutes after it struck the iceberg. It was the first time that the SOS message had been sent at sea. The special event commemorative station GB90MGY will be active on CW-only on all amateur short wave bands from 80 to 10 meters (including WARC bands), from 1000 hours GMT Saturday, April 13th, to 0219 hours Monday, April 15th (the precise time when the *Titanic* sank).

## HAMSATS

*continued from page 45*

### What does it mean?

Our amateur satellite frequency allocations are a very valuable resource. The ITU has specifically set aside 144-146 and 435-438 MHz in the VHF and UHF spectrum for the Amateur Satellite Service as a subset of the Amateur Radio Service. Other allocations also are in place, but the VHF and UHF bands are the most popular. For those that recognize the authority of the ITU, the rules have the status of an International Treaty.

In some countries amateur radio is viewed as a public service, while in others it is seen as an educational resource, a simple hobby, or as a training ground for commercial endeavors. A few countries even treat ham frequencies as just another place to do business regardless of international agreements. The ITU and IARU certainly have their hands full attempting to police the world for spectrum misuse. For satellites the

problem is further compounded by coverage area. A typical sun-synchronous, low-Earth-orbit (LEO) satellite like MAROC-TUBSAT will be in range of every spot on the Earth several times a day.

AMSAT (The Radio Amateur Satellite Corporation) was established in 1969 as a nonprofit scientific and educational entity tasked primarily with building and operating satellites within the Amateur Satellite Service. Today there are many AMSAT organizations, all working to promote similar goals. The IARU was established in 1925 as a worldwide federation of national amateur radio societies.

AMSAT drafted and approved a document in 1997 called "Background Information for Prospective Owners and Operators of Satellites Utilizing Frequencies Allocated to the Amateur-Satellite Service." The IARU immediately adapted this document for international use. You can find it on the Internet at [http://www.iaru.org/satellite/propective.html]. It is easy to understand and is now the standard for satellite builders.

If the groups behind MAROC-TUBSAT had taken a bit of time to check out information from the IARU or any AMSAT organization, they would have been able to easily avoid their current difficulties. The downlink on 144.1 MHz was not a good choice. In many parts of the world, this frequency is seen as a weak-signal calling frequency. Most educational satellites with two-meter downlinks are coordinated to use 145.825 MHz due to worldwide congestion. More options are available for those with 70-cm downlinks.

### What's next?

In the months and years to come, we expect dozens of small satellites to take to the sky on amateur frequencies. Most of these are from educational institutions with strong ham-radio ties. Many have been in contact with the IARU or AMSAT. A few have not, but at least are cognizant of the guidelines available in the IARU document.

One new educational hamsat to watch for is Kolibri, a Russian/Australian project for students at the Ravenswood Girls School and Knox Grammar School in Sydney, Australia, and the Obninsk school system through the Center of Computer Technologies at the Institute of Atomic Power near Moscow, Russia. The small satellite has a primary downlink on 145.825 MHz FM with telemetry and recorded voice. It has been on the International Space Station for a number of months, and was scheduled to be hand-launched in late February or early March, 2002, during a spacewalk. We'll



have more on this endeavor next month, but for now you can check for updates on the AMSAT home page [<http://www.amsat.org>] and in an excellent article by Anthony Curtis K3RXX at [<http://www.arrl.org/news/features/2001/12/16/1/>]. 73

## THE DIGITAL PORT

*continued from page 50*

few FYIs for those who think I made this sound so easy. The Linux is co-existing on a hard drive with Win95, which, up to this point in time, refuses to boot. Hopefully, that can be overcome sometime in the near future.

Other than a casual reference to "Don't try this at home," I have learned to advise that the system really needs a relatively fast CPU with plenty of RAM and that a person would be very wise to invest in a separate hard drive just for Linux. There is also a smaller version of the operating system available, but I do not know anything about how it works. It would seem for our purposes that we will need all that is available with the "regular" installation. More later.

## A hint of something new coming

By the time this hits the magazine, the following may have become a reality. I noticed a ham was mentioning the Logger program was about to come up with a new version that should cause new respect. He was saying how it was being tested in an "all-in-one" format. Not sure what that means, but perhaps we will know by the next time I sit down to write this column.

That about wraps it up for this go-around. If you have comments or questions about these subjects, I will be glad to help however I can. Drop me a line at [KB7NO@worldnet.att.net]. 73 for now, Jack KB7NO. 73

## ON THE GO

*continued from page 51*

not necessarily meet the needs of the Amateur Radio Service. Is the local police chief somewhat ambivalent to amateur radio as a resource? One of the many benefits of being an American is that we have elected officials who tend to be much more responsive. The city council member might be far more interested in listening to how involved a group of voters are in supporting the community. Similarly, your congressman needs to be aware of what his or her constituents are doing to help out.

Have one of the members of your local ham group contact a staff member at your congressman's office. Realistically, it is probably more effective to work through an aide than to try to get directly to your elected official (although if he or she responds directly, so much the better). Invite the staff member to Field Day or the local disaster drill. Get pictures of the aide sitting in the emergency van or similar photo opportunity and publish them on your club's Web page and newsletter, and send a copy of the newsletter to the congressman's office. Maybe it'll catch the congressman's attention. If it does, he or she might be there for the next photo opportunity. Make sure you show or tell him what we can do, what we have proven in the past, and what we are committed to do in the future. Show a schedule that demonstrates that your local group can provide extended operations and the log showing the names and callsigns of all the check-ins to the weekly ARES or RACES net.

This is important. Our country has a need that we have proven we can meet, and our leaders are not aware of ham radio as a resource. Let's make sure that we truly are prepared to serve and that the right people know who we are and what we can do. 73

## NEVER SAY DIE

*continued from page 48*

boards, offering them at one price built and tested, and charging more in kit form because he knew he'd have hand-holding problems.

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## Special DX Forecast

*April is usually favorable for HF communications but I'm predicting that this will turn out to be more the exception than the rule.*

Numerous active sunspots will cause erratic propagation conditions throughout the month with fewer good days than one might normally expect. In fact you'll notice that there are only two solidly Good(G) days marked on the calendar with only eight other days listed as Fair to Good (F-G). The dates marked as Poor (P) are very likely to be associated with M and X-class solar flares or CMEs, so expect geomagnetic disturbances to follow within 48 hours if such events occur and are Earth-directed.

There has been a resurgence of sunspot activity since late last year and experts now agree that we are experiencing a second peak in cycle 23. This is not unusual since about a dozen dual peaks have been observed over the last 400 years. What is surprising is that this is the third cycle in a row that we've had one. An interesting pattern that seems to have emerged is that dual peaks occur 15 to 18 months apart, but the reason why is uncertain.

One possibility has to do with changing rotational velocities of gas currents near the base of the "convective zone," the turbulent top third of our sun. This is the region thought to be where most of the sun's magnetic field is generated. Just last year, using a technique called helioseismology, scientists were able to probe the sun's interior and measure these currents speeding up and slowing down about every 16 months. Whether this happens continuously or only during solar maximum is yet to be determined.

Exactly how this might relate to the sunspot cycle and the formation of new sunspots is also unclear. Sunspots themselves are only a minor part of the whole solar picture but obviously the activity associated with them can produce dramatic changes in the Earth's magnetic field. Over the solar cycle these effects have important consequences for the Earth's upper atmosphere and, as we all know, the propagation of high frequency radio waves.

73 until next month ...

April 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
	1 P	2 F-P	3 F	4 F-G	5 G	6 G
7 F-P	8 P	9 F-P	10 F	11 F	12 F-P	13 F
14 F	15 F	16 F-G	17 F-G	18 F-P	19 P	20 F-P
21 F	22 F-G	23 F-P	24 F-G	25 F-G	26 P	27 F-P
28 F-G	29 F-G	30 F				

EASTERN UNITED STATES TO:																
Country	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Central America	(15-20)	(15-20)	(20-40)	x	x	x	(10)	(10)	(10-15)	10 (17)	10-15	12-20				
South America	(17-20)	20 (40)	20 (40)	(20-40)	x	x	x	(10)	(10)	(10-15)	10-15	10 (20)				
Western Europe	(20-40)	(80-40)	(80-40)	(40)	x	x	(15-20)	(10-20)	(10) 17	15-20	(16) 20	(20)				
Southern Africa	(17-20)	(20-40)	(20)	(20)	x	x	x	(10)	(10-15)	12 (17)	(15-20)					
Eastern Europe	x	(30-40)	(20-40)	(17-20)	(20)	x	x	(10-15)	(15)	(17-20)	(20)	(20)				
Middle East	x	(20)	20	(20-40)	(40)	x	x	x	(10-15)	15	(17-20)	(20)				
India/Pakistan	(17-20)	x	x	x	x	x	x	(15-17)	x	x	x	x				
Far East/Japan	(17-20)	(20)	x	x	x	x	x	x	x	x	x	(15)				
Southeast Asia	(17-20)	x	x	x	x	x	(17-20)	(10-15)	x	x	x	x				
Australia	(15)	(17-20)	x	x	x	x	(20-40)	(20)	(10)	x	x	x				
Alaska	(15) 20	(20)	(20-30)	(30-40)	(40)	x	x	x	(15-20)	(10-20)	(10) 17	15-20				
Hawaii	(15) 20	20	(20-40)	(20-40)	(40)	x	x	x	(15-20)	(10-20)	(10-20)	15-20				
Western USA	15-20	20 (40)	20 (40)	(20) 40	(30-40)	x	x	(10-20)	10 (20)	10 (20)	10 (20)	(15) 20				
CENTRAL UNITED STATES TO:																
Country	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Central America	(15-20)	20 (40)	20-40	20-40	(20-40)	x	(10-20)	10-20	10-20	10 (20)	10 (20)	10-20				
South America	(15) 20	17-30	20 (40)	20 (40)	x	x	x	(10-20)	10 (20)	10 (15)	(10-20)	12 (20)				
Western Europe	(20)	(40)	(40)	x	x	x	(15)	(15-17)	(15-20)	(17-20)	(20)					
Southern Africa	20	(20)	(20)	(20)	x	x	x	(10)	(10-15)	(10-17)	(10-20)					
Eastern Europe	(20)	(20)	x	x	x	x	(15)	(15-17)	(17-20)	(20)	(20)					
Middle East	x	x	x	x	x	x	x	(15)	(15)	(20)	(20)					
India/Pakistan	(17-20)	(15-20)	x	x	x	x	(15-20)	x	x	x	x					
Far East/Japan	(17-20)	(20)	x	x	x	x	x	x	x	x	(15)					
Southeast Asia	(15-20)	x	x	x	x	x	(20)	(10-20)	x	x	x					
Australia	(15-20)	(20)	x	x	x	x	(15-20)	(15-20)	15	15	15 (20)					
Alaska	15-20	(15) 20	20	(20-30)	(30-40)	(40)	x	x	(10-20)	10-20	10 (20)					
Hawaii	15-20	(15) 20	20 (40)	(30-40)	(40)	x	x	x	(10) 12	10-15	(10) 17					
WESTERN UNITED STATES TO:																
Country	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Central America	10-20	15-20	15-30	(14) 40	20-40	(30-40)	x	(15-20)	10 (20)	10 (20)	10 (20)	10 (20)				
South America	(10) 20	(15) 20	20 (40)	20 (40)	x	x	x	(10-20)	10 (20)	(10-15)	10 (15)	10 (20)				
Western Europe	x	x	x	x	x	x	x	(15-17)	(15-17)	(17-20)	(17-20)					
Southern Africa	(20)	(20)	(20)	(20)	(20)	x	x	x	x	(10-12)	(12) 17	(15-20)				
Eastern Europe	x	x	x	(17-20)	(17-20)	x	x	(15)	(15)	(15-17)	(17-20)	(20)				
Middle East	x	(20)	(20)	x	x	x	x	x	(15-17)	(20)	(20)	(20)				
India/Pakistan	x	(17-20)	x	x	x	x	x	(15-17)	x	x	x	x				
Far East/Japan	10-20	(20)	x	x	x	(40)	(40)	x	x	x	x	(10-20)				
Southeast Asia	(10-15)	(10-15)	x	x	x	x	x	x	x	(15-20)	(15-20)	(10-15)				
Australia	(10-15)	(15)	(17-20)	x	x	x	x	(15) 20	(15-20)	(15)	(10)					
Alaska	(10) 20	(15) 20	20 (40)	(20) 40	(30-40)	(40)	(40)	(40)	x	(10-15)	10-15	10-20				
Hawaii	(15) 20	20	(20-40)	(20) 40	(30-40)	(40)	x	x	x	(10-20)	(10) 20	15-20				
Western USA	15-20	20 (40)	20 (40)	(20) 40	(30-40)	x	x	(10-20)	10 (20)	10 (20)	10 (20)	(15) 20				

Table 1. Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



## Band-by-Band Summary

### 10-12 meters

10 and 12 meters will have already begun to wane and will continue to deteriorate as the weather warms up. Some activity will still be available to the east in the morning and to the west during the afternoon, but the duration of openings will be short. The strongest peaks will usually occur in the afternoon and short-skip distances will fall between 1,000 to 2,200 miles.

### 15-17 meters

15 and 17 meters will still be fairly workable, but mostly to the Central and South America. Look for a few openings toward Europe before noon, a strong peak to Central and South America around midday, and some weaker activity to the west from late afternoon to mid-evening. Short-skip will average around 1,000 miles.

### 20 meters

20 meters will be open to most areas of the world and is your best bet for most times and conditions. Peaks occur right after sunrise and again just before sunset. The southern hemisphere will be very active with strong DX signals on good days. Short-skip may vary from 500 up to 2,500 miles depending on conditions.

### 30-40 meters

These bands should be good choices from late evening until sunrise but atmospheric noise will be higher than last month as the subtropics heat up. The most reliable openings will be to the southern hemisphere but North Africa, the Middle East, and Central Asia may provide some interesting opportunities when conditions allow. Daytime skip will be less than 1,000 miles but nighttime distances will be beyond 700 miles.

### 80-160 meters

80 and 160 meters will be spotty and can't be relied on because static from tropical storms will be the norm. Have a listen if 40 meters is open but don't expect many stations to come booming in from halfway around the world. Short-skip on 80 meters should average over 2,000 miles at night while skip on 160 will fall between 1,000 and 2,000 miles. If there are any daytime openings at all skip will only operate out to 300 miles or so.

## NEVER SAY DIE

*continued from page 59*

bother with all that anymore. If something stops working they don't fix it, they replace it. They no longer have any need for tech schools. I'm not even sure they bother to fix the stuff when it's replaced. I'll bet we'll find that they just crush the stuff and throw it away. With Congress and the Administration okaying any military budget submitted, why should they worry about economizing?

Our military is spending more today than they did in the 1970s and early 1980s when we were: "fighting communism."

When I was teaching radio school at the submarine base in New London, they had a huge warehouse packed solid with radio, radar, sonar, and test equipment shipped there to be installed on the new submarines that were under construction. When the war ended and new submarine construction was halted, all that brand new stuff was unpacked and crushed. Tens of millions of dollars worth of fabulous equipment. Receivers hams would have given their eye teeth for. Oscilloscopes, General Radio signal generators, and so on. Sure, there was a bunch of war surplus equipment that hit the market, but virtually none of it came from the Navy. They destroyed theirs, apparently because of a secret agreement with the manufacturers not to spoil their postwar sales of new equipment.

I heard about this happening at Navy bases all around the world. In Guam there was a pile of Teletype machines over a hundred feet high that hams would have given anything for. And so on.

The military, with an endless supply of our money, doesn't have to be careful. And it's more practical with today's short, intense wars to replace broken equipment and forget it, so we're not seeing military surplus. Not that most of it would be of much use. The stuff is too specialized today.

So our surplus houses are long gone. We only have a few kit manufacturers. And old-timers grumble about our not making our own equipment anymore as they tune their Icom radios, looking for someone to complain to.

### Water

How come I keep stressing the importance of drinking *distilled* water? Don't we need the minerals we can get from our water supply? Dr. Allen Banik, who's spent much of his life researching the effects of water on the human body, says, "The only minerals the body can utilize are the organic minerals (from plants). All other types of minerals are foreign substances to the body and must be eliminated. Distilled water is the only

water that can be taken into the body without damage to the tissues." And Dr. Charles Mayo (Mayo Clinic) says that inorganic minerals in solution are the cause of much human disease.

Are you drinking at least ten glasses of pure water a day? And two glasses for every cup of coffee or tea you drink.

There's a \$119 steam distiller available. See [www.steamdistiller.com](http://www.steamdistiller.com) for the sales pitch.

### Windmills

I see where Ireland and UK are starting to install offshore windmills as a way to phase out their coal generating plants. Each will have 200-foot rotors and generate 3 megawatts.

Ireland's wind farm plan is to install two hundred wind turbines four miles at sea in water up to 81 feet deep. This will supply about the same amount of power as a large coal-burning plant. Twenty turbines are expected to be in place by fall this year.

It would take about a million wind turbines to supply America's energy needs, but it sure would cut the cost of electricity and free us from a lot of pollution. It would also help us not to leave a planet stripped of coal and oil for our great grandchildren.

I'd rather see some developmental effort for cold fusion-powered units, where we could use our nuclear waste as fuel, generating heat and electricity while we clean up our nuclear waste storage sites. That would bring us energy at about a tenth of today's cost.

### Reincarnation

If you are in denial about reincarnation, it's because you haven't read any books on the subject. Well, it's easy to disbelieve things you know very little about.

I first ran into reincarnation when I was doing Dianetic auditing back in 1950. I found that in quite a few cases, when under hypnosis I asked my patients to go to the first time something traumatic had happened in the past which was causing them problems in their present lives that they went to a death in a previous life. People who'd died by drowning in a past life often had a fear of the water in this one.

I deconditioned the trauma just as I would one in their current life and this always cured their problem.

I've read some excellent books on the subject, including a new one by Tom Shroder, *Old Souls*, from Simon & Schuster, ISBN 0-684-85193-8, 255 pp., 1999, \$12. This is Tom's story of his

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## NEVER SAY DIE

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work with Ian Stevenson, a physician and psychiatrist who has investigated over 2,500 cases of young children who have memories of their previous lives.

In the book Tom takes us through Stevenson's investigation of several children who remembered previous lives. There was one case where as a Lebanese woman died, she promised her husband that she'd be back as soon as she could. A few weeks later a baby girl was born in a village about a hundred miles away. As soon as the baby started to talk she was pleading to go to her village and be with her husband and children. When her parents finally did make the trip with her she was able to name many of the people they met in her old village and point out things from her memories.

The book is interesting, but I won't add it to my *Secret Guide to Wisdom* review of books because I found it too slow-going. Too much travelogue and not enough interesting cases. However, if you want to learn about the reality of reincarnation and past lives, give it a read.

### Extinction

Art Bell has interviewed a couple more pretty convincing gloom-and-doomers. It's almost been enough to make me think.

In my *Human Extinction Prophecies* book, I cite Nostradamus' prediction of a soon-to-come pole shift that would move the poles to somewhere over Siberia and South America, wiping out 97% of humans in the process. The old geezer has been right on the money with most of his predictions, so he's got a lot of credibility.

Then we have Edgar Cayce, promising us a similar catastrophe in the near future. And his prophecies have been remarkably accurate too. Hmm. Gee.

Next comes Chet Snow and his *Mass Dreams of the Future*. Chet's team interviewed a couple thousand people under hypnosis about their future lives. More bad news.

Gordon Michael Scallion K1BWC is another well-known prophet. He, too, has been predicting a major calamity. I have his map of the U.S. as he says it will look after the event and it looks remarkably similar to the one Nostradamus drew 400 years ago. I checked with Gordon and he's gotten prepared with a mostly underground home and plenty of emergency power generating equipment. He lives about 40 miles west of me. Both of our locations will, according to his map, be above the new water level. But good-bye to all of our coastal cities.

One of the two new doomers on Art's

show got his story of what's going to happen from someone he contacted psychically 5,000 years in the future. Something came along at around this time and wiped out all of the cities and put what few people were left back into the cave-man age. In view of the warming of Antarctica he suggested that the mile-high ice sheet covering much of the continent, which is larger than the U.S., might suddenly slide into the ocean, creating a tidal wave a half mile or more high which would travel at about 500 miles per hour all the way to the North Pole, wiping out everything in its path.

This could, in turn, wobble the planet into a pole shift. A double whammy.

Art's next doomer made a good case for that elusive tenth planet which Zecharia Sitchin found described in ancient records as Niburu making a comeback in March next year. He says it'll pass between the sun and earth, causing us havoc. And maybe triggering that pole change.

Hmm, maybe it's about time to get a little dug for an underground retreat and put a dome over it. I'll need a solar power system (like Scallion's), plus a propane-powered generator and a big tank (like Scallion's) to provide power for my ham station and computers for a few weeks until the sun comes out again.

Could a major catastrophe wipe out the technology we've developed over the last few hundred years? Well, if we have no coal or oil, we'll have no transportation or communications and no way to refine metals.

This all seems unlikely, but if anything happens, remember that you saw it here. If nothing happens, forget the whole thing.

### Home Power

If anything catastrophic does come along, the people who are not living in cities and thus have a better chance of survival are going to need to generate their own power. That comes down to solar and wind power at present. The cost of solar panels has been dropping, making that approach more attractive. But the cost of the batteries and other equipment still makes it an expensive way to go.

A bunch of small windmills, as described in the December 2001 issue, is another practical approach.

Ken West KC7TRM E-mailed me another approach which could be developed to harness the sun's power. This was developed by John Mountain, but never commercialized. It uses a bunch of Fresnel lenses to concentrate the sun's rays onto some pipes filled with a liquid which can be heated to 600° or so and stored in a well insulated tank below the

ground. A heat exchanger can deliver the heat to a home via steam, as well as use the steam to drive a turbine to generate electricity to keep storage batteries charged. This would require a space about six by twelve feet, considerably less than a solar array. And could be less expensive. Anyone interested?

### Hydrogen

It's a dangerous fuel, but so is gasoline and kerosene — as used in the WTC attack. But if the "war on terrorism" starts jacking up oil prices, as seems likely, we're going to be looking for practical alternatives.

Hydrogen is easy to make — just separate it from the oxygen in water, save the hydrogen and let the oxygen into the atmosphere. We could use a few extra billion tons of oxygen a day for a long time to come.

But it takes energy to make hydrogen. Big deal, we've got boundless energy available from Mother Nature (a.k.a. God). Where? All around us. Like the action of ocean waves, which can be used with floats to turn electric turbines. Tidal flows, some very strong, can be harnessed. A million undersea volcanoes are releasing incredible amounts of heat. Ditto those heat vents all along the midocean tectonic plate edges.

As long as oil was cheap, and the oil companies in firm lobbyist control of Congress and the White House, there was little interest (money) in developing competing technologies. Some \$4.99 prices or long lines again at gas stations and we might see more public unrest with the status quo.

Will we eventually be seeing cars with hydrogen bottles for fuel? Will we see fuel stations selling refilled hydrogen bottles? How many bottles will it take to go, say, 300 miles? As a scuba diver in an hour I pretty well use up a tank filled with 3,000 pounds of air. And those aluminum scuba tanks are heavy to lift.

Well, if it's impractical for cars, maybe hydrogen trucks can refill our home tanks.

### Fired!

As the recession continues, with our larger companies laying off thousands of employees (I almost said workers), there's an upside for the survivors and a "what in the hell am I going to do now?" sudden shock for the downsized.

The midlevel survivors are moving up to top-level jobs. The lower-level survivors are finding themselves having to do the work that two or three did before. This should not be difficult.

Continued on page 64



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No. I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Bioelectrifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about

the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

**Wayne's Caribbean Adventures:** My super budget travel stories — where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Cold Fusion Journal:** They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

**Julian Schwinger:** A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

**Dowsing:** Yes, dowsing really does work. I explain how and why it works, opening a huge new area for scientific research with profound effects for humanity. \$2 (#84)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. I explain the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts — like Hagood, Einstein, Snow, Noone, Felix, Strieber. \$5 (#31)

**Moonoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with readers who worked for

NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73:** Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 Editorials:** 120 pages, 100 choice editorials. \$10 (#72)

**1997 Editorials:** 148 fun-packed pages. 216 editorials. \$10 (#74)

**1998 Editorials:** 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)

**1999 Editorials:** 132 pages of ideas, book reviews, health, education, and

anything else I think you ought to know about. \$10 (#76)

**2000 Editorials:** 76 pages (thinner magazine as a result of our slowly dying hobby) \$5 (#77)

**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Silver Colloid Reprint:** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98)

**Colloid Kit:** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)

**Wayne's Bell Saver Kit:** The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

**Cold Fusion Six-Pack:** Six Cold Fusion Journal back issues to bring you up to speed. \$20 (#19)

**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs — such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$35 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon you wondered at their weird gait. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of giveaways that the photos and films had been faked. \$46 (#93)

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Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

**Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the June 2002 classified ad section is April 10, 2002.**

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## NEVER SAY DIE

*continued from page 62*

The recession has been accelerated by consumer panic over the terrorist attack on the World Trade Center. They're not sure what this means, so they're sitting at home watching for more anthrax cases and the continuing coverage of the WTC mess. What they're not doing is buying or traveling. They're not spending money. And that's hurting business on all levels.

Job survivors are no longer complacent about their jobs. What if the recession continues? How long will it be before the ax swings again and their head is staring up blankly from the basket?

If you've been reading my essays for long you know what my advice to both the downsized and the potentially downsized is. Start your own business. 73



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# 73 Amateur Radio Today

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## How to Build "Maui-Style"

## The Maltese Welcome

## "Radio Insurance" You Should Have

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## QRX . . .

### 'Til DX Do Us Part?

Get ready for a first. The first-ever wedding to be held at the Dayton Hamvention. No, we are not kidding.

For the first time in Hamvention history, wedding vows will be exchanged at the show. This, as Cyndi Krieger and Mark Elliot N8WZW will be married Saturday, May 18th at the HARA Arena during Hamvention 2002.

Mark and Cyndi met about 13 years ago through a

mutual friend. On their first date, they went out for dinner and a movie. According to Hamvention sources, they have been an "item" ever since.

Mark introduced Cyndi to amateur radio by going to a hamfest. Cyndi had no idea what a hamfest was, but it sounded interesting. It was, and she was hooked! Cyndi is now studying for her license and may test for it before Hamvention weekend.

Why get married at Hamvention? Mark and Cyndi couldn't think of a better place to share their love

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article [IBM (ok) or Mac (preferred) formats], carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

### NEVER SAY DIE

Wayne Green W2NSD/1

w2nsd@aol.com

www.waynegrain.com

#### Better QSOs

How often do the people you talk with on the air tell you how much they've enjoyed the contact when they're signing off?

So what's the secret?

That's easy! Just get into a conversation on the one topic your potential new friend is most interested in. What's that? Himself, of course. The more you get him to talk about himself, the more interesting the contact is going to be for him.

None of us gives a bear's butt about what make rig or antenna the other guy's using. Nor do we care much about his weather. What's he do? What're his other interests? Get him talking about his most favorite subject. Has he found any really interesting Web sites? Made any trips recently?

I've been totally failing for months to get you to tell me about the most exciting times you've had in ham radio so I can use these stories to help get youngsters interested in the hobby. Well, maybe you can ask the next few guys you work about their most exciting ham adventures. And then get them to send me the stories via w2nsd@aol.com. Subject: ham adventures.

I suspect that the main reason 80% of our licensees are burned out is the endless parade of boring contacts which eventually drove them off the air. We've got a fabulous communications medium, we just have never learned to communicate. Hello, CQ twenty ... ZZZZZ.

#### Dayton

Many readers asked if I was going to come to Dayton this year. Nope.

First, I didn't get invited. They stopped asking me to speak several years ago when the ARRL put on the pressure. I'm the competition, ya know.

Second, I haven't time. I've been busy every waking hour trying to keep up with the demand for my books resulting from my appearances on Art Bell's "Coast-to-Coast AM" show. Whew! And if that isn't enough, I'm also starting a new magazine which is due out starting this month. It's *NH ToDo*, and its aim is to increase New Hampshire tourism by publishing articles on how much fun the things are that we have to do.

This project has had me giving talks to New Hampshire chambers of commerce, Rotary Clubs, Lions, Elks, and veterans groups all around the state. Plus radio and TV interviews. Yes, of course I get in plugs for ham radio at every opportunity.

I've had a few ham clubs set up telephone talks for me. I'd like to have more.

I love to talk about the greatest disaster in the history of the hobby, and the day that Khrushchev saved amateur radio. I also enjoy being an iconoclast. A disestablishmentarianist. Controversial.

Heck, all I want to do is destroy the medical and pharmaceutical industries, nursing homes, assisted living services, the sugar industry, the fast food industry, the

food giants, our present lousy school system, pet food companies, the Social Security system, our prison system, our colleges, and stuff like that.

#### That Wretched Pole Shift

If the Earth is indeed an oblate spheroid (flat at the poles and bulging at the equator), then how would it be possible for the polar axis to shift? Clearly, there's nothing to really worry about.

Except.

Except, how else can we explain woolly mammoths being defrosted in Siberia with tropical flowers still in their mouths? Instantly deep frozen.

Except for René finding proof of the equatorial bulge more than elusive.

Except for the research of Charles Hapgood into very ancient maps.

Except for the predictions of a coming pole shift by prophets like Nostradamus and Edgar Cayce.

Except for an E-mail from Tom N8ECW: "I've dug out some books that I bought about fifteen years ago. You've talked about pole shifts in your past editorials. Gene Savoy has done a lot of exploring and studied a lot of ancient cultures. After going over the work done by him, I think that a pole shift would be more likely to occur after a sudden burst of energy from the sun. This could possibly happen during the next 11-year sunspot cycle. This peak should occur right about late 2012, the same year that the Mayan calendar expires."

Whew! That gives us another ten years respite.

With the current sunspot maximum being double-spiked and lasting longer than any other in recorded history, it's possible that the next one could be a doozie. If we weather 2003 without a major catastrophe, I'm definitely going to have an underground home done by 2012. Right now I'm too busy getting my health guide out to the few people who have not been totally brainwashed by the medical industry and starting *NH ToDo* magazine.

A recent Art Bell guest made a good case for Planet X, a brown dwarf companion to our sun, coming around next year on its 3,660-year orbit. Zachariah Sitchin reported on this planet being described in ancient manuscripts and being called Niburu. It caused huge cataclysms on its last pass. Next year it's supposed to pass between Earth and the sun, where it could easily create havoc — possibly the predicted pole shift.

I talked with prophet Gordon Scallion K1BWC, and he's all set with an underground bunker, food, and emergency power.

If any of the prophets are right, this is not a good time to be living in a city. Or even near one.

#### Good Fortune

My Chinese buffet lunches end up with a fortune cookie. I save the fortunes. Today's

*Continued on page 8*



*continued from page 1*

for each other and for amateur radio than by getting married at the world's largest amateur radio trade show. The ceremony takes place at 3 p.m. in Forum Room 3, immediately following the Amateur Radio Newsline-produced Ham Radio Town Meeting.

*Thanks to Newsline, Bill Pasternak WA6ITF, editor.*

## Hamvention 2002: Award Winners Named

The Dayton Hamvention has named Radio Amateur Information Network founder Alanson "Hap" Holly KC9RP as its 2002 Radio Amateur of the Year. Holly received the news of his selection on Thursday evening February 28th in a phone call from Cathi Hoskins N8ZCQ, who chairs the Hamvention Awards and Banquet Committee. KC9RP was completely taken by surprise: "I was absolutely stunned! In fact, all I could say was, 'Me?' I mean, seriously, I was just absolutely floored."

Holly, who lives in Des Plaines, Illinois, has been licensed since 1965. He began his ham radio informational programming career in 1984 on a local Chicago area repeater. This eventually led him to become founder, moderator, and guiding light of a weekly amateur radio audio feature magazine known as the *RAIN Report*.

*RAIN* programming is distributed to hundreds of repeaters across the country via a telephone dial-up line, via the [rainreport.com] Web site, by a subscription tape service, and broadcast over WAØRCR's weekly 160-meter informational net.

But that's is only a small part of the Hap Holly story. Originally licensed in Escondido, California, at age 14, Holly, who has been blind since age 7, served as a phone-patch station and net control for the famed WESTCARS traffic net until 1970. He then headed off to Principia College in Illinois, and, from 1970 to graduation in 1974, ran phone patches and kept radio schedules for many of his fellow students.

Holly graduated from Principia with a bachelor of arts degree in sociology, and soon found himself in the Chicago area. There, he sought out world-class jazz accordionist Leon Sash, to pursue further training in music. As a professional keyboard player, Holly's diverse repertoire of American music of the past six decades has made him a popular choice in the Chicago area.

Hap met his wife-to-be while he was teaching a class in nonvisual perception to high school students at a summer camp in Buena Vista, Colorado. The two were married in August of 1976. Stephanie, who is

sighted, received her ham ticket and KA9WKD callsign in 1986.

Over the years, Hap Holly has written articles for the *Spec-Com Journal* and *Radio Scan Magazine*, and occasionally reports for the *Amateur Radio Newsline*. Holly is also a common sight at the Dayton Hamvention, taping forums which are then incorporated throughout the year into his *RAIN Reports*. And, since 1975, KC9RP has been an honored member of the Des Plaines Lions Club. He has also been a member of the Des Plaines Toastmasters since 1976. He and Stephanie are also active with the Des Plaines, Illinois, Emergency Medical Alert system.

Named as this year's Hamvention Technical Excellence award winner is Alan Waller K3TKJ, of Laurel, Delaware. Waller was chosen for his work that led to interfacing the Internet to Amateur Radio.

First licensed in 1961, Waller combined his decades-long love for amateur radio and a burgeoning interest in the then-new Internet to design and manage the [www.qsl.net] and [www.qth.net] Web sites. That was back in 1993. Since that time, Alan Waller's Web sites have come to serve the needs of tens of thousands of ham radio operators worldwide by providing a vast technical reference platform, an electronic mail service, Web page hosting services, and links to thousands of other ham radio-related sites. And in the true spirit of amateur radio, Waller's initial work utilized leading edge experimentation to see what could be done with the technology then available. This has developed into a mature, reliable service to the worldwide ham radio community.

Rounding out this season's winners are a pair of space exploring hams who have been named as co-recipients of the 2002 Hamvention Special Achievement Award. Former astronauts Owen Garriott W5LFL and Tony England WØORE are being honored for paving the way for manned ham radio operations from the space shuttles that have made ham radio a permanent part of man's exploration of space.

Owen Garriott W5LFL was first. On November 28, 1983, Garriott was launched into space aboard the space ship *Columbia* for the STS-9 mission. It was the Spacelab 1 mission and Garriott brought along the first amateur radio station on a crew-tended space vehicle. It was a simple Motorola hand-held transceiver connected to a special antenna designed to fit in the Space Shuttle's window.

Three days later, W5LFL came on the air, and hams across the United States and around the world were witness to a historic radio transmission:

"This is W5LFL in *Columbia*. W5LFL in *Columbia* orbiting the Earth at an altitude of 135 nautical miles passing over the U.S. West Coast and calling CQ."

Among those who heard Owen Garriott's amateur radio transmissions from space was Lance Collister WA1JXN of Frenchtown, Montana.

Collister, who is now W7GJ, is credited with being the first amateur to work an astronaut in orbit.

The success of Garriott's mission led to the development of SAREX — The Shuttle Amateur Radio Experiment. And, over the years, SAREX permitted youngsters in classrooms around the world to speak directly with astronauts in space. But for this to happen, the technology of manned ham radio operations from space had to be enhanced. This aspect of the then new SAREX program fell to the next ham radio operator orbited: Tony England WØORE.

WØORE flew into space on the shuttle *Challenger* in 1985. It was Mission 51F, Spacelab 2. In addition to the 2-meter FM voice gear, Tony England also had with him the first-ever ham television station to go into space. Slow-scan, yes, but capable of sending back high resolution images which hams on the ground equipped with SSTV gear could view live or record on a simple audio cassette for later viewing and historical archiving. From space, Tony England described the station he was using:

"Essentially we've got a commercial TV camera that anyone could go out to their local radio store and buy. We feed this into a scan converter built by a commercial outfit and modified by NASA — amateur radio clubs and this takes a snapshot of the scene and digitizes it and puts it in a memory.

"Then it's sent to a handle-talkie like this. From there we will send it over a wire up to the upper window upstairs and to this antenna when I get it up there in the window. Then it will be transmitted to the ground.

"When we get going, we will be able to send color TV images of what we are doing on board as a series of snapshots updated every 10 or 20 seconds. Amateurs anywhere on the ground will be able to receive them, and ones with scan converters will see the pictures."

That flight also marked another first: the first-ever two-way television — ham radio television — to and from space.

Tony England went on to flight-prove both the improved FM voice and then new SSTV systems. The SSTV was so successful that NASA gave very serious consideration to a permanent installation on all shuttles for backup communications. More important, the early on-orbit operations by Owen Garriott W5LFL and Tony England WØORE made possible the thousands of educational contacts between children in school classrooms and the crews flying in space — first on board the shuttles, and now as a permanent part of the international Space Station.

Hap Holly KC9RP, Alan Waller K3TKJ, Owen Garriott W5LFL, and Tony England WØORE will receive their honors at the Hamvention Awards Banquet slated for Saturday evening, May 18th, at the Nutter Center in Dayton, Ohio.

*Thanks to Newsline, Bill Pasternak WA6ITF, editor.*



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## FCC Approves Ultra-wideband

The nation's communications regulators have approved limited use of a new technology that is actually capable of seeing through walls, finding disaster victims, and even preventing car crashes. Known as ultra-wideband, this new method of wireless transmission is being promoted as a potential solution to the squeeze on the nation's airwaves created by the explosion of mobile phone, pager, and other wireless device usage.

Ultra-wideband devices will for now operate only in 960 MHz and in the 1.99 to 10.6 GHz bands. In theory, at least, you should never even know that they are there. This is because proponents of ultra-wideband claim that interference to other spectrum users is virtually nonexistent — based on the ultra-short duration and pulsed nature of the transmissions. And the Federal Communications Commission agreed, when it voted unanimously about a week ago to allow the technology to be used on a limited unlicensed basis.

The FCC proceeded cautiously out of uncertainty whether ultra-wideband could coexist with other strategic services. In other words, it wanted to be certain that it would not cause harmful interference to military communications, cellular telephones, and the Global Positioning System. So it only provided ultra-wideband access to a small portion of RF real estate. Nonetheless, the real-life implications of the limits of the FCC decision are far-reaching.

Up to now, the military has been the only ultra-wideband user. This FCC action will allow for wireless communications and accurate readings of location and distance that have a wide range of civilian applications. For the general public this includes wireless, high-speed transmissions over short distances, possibly as a way of sending video from a camcorder to a television set or data from a personal digital assistant to a laptop computer. The technology might also include sensor systems in cars to alert a driver to movement near the vehicle. This could prevent collisions and promote smart air bag deployment.

Otherwise, the FCC has limited use of ultra-wideband technology for public safety. Only police and fire officials, scientific researchers, and mining and construction companies will be permitted the use of so-called ground-penetrating radar

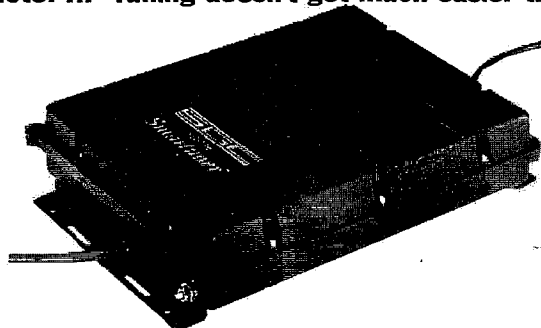
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## NEVER SAY DIE

continued from page 4

said, "A person of words and not of deeds is like a garden full of weeds."

Okay, what kind of a mark will you leave on the world to show that you were here? Have you created anything of significance? Music? A work of art? Written a book? Maybe an invention? Or perhaps you've done some research? If not, why not? It isn't as if there aren't an unlimited number of things that need to be done.

We are in desperate need of creative music and art. And there sure is a shortage of first rate books.

In the research department, as I've written endlessly over the years, all you have to do is grab an anomaly that establishment science has swept under the rug and go with it. This is what John Mack, the psychologist, did. He wanted to find out more about the contactees, so he started interviewing 'em. And that led to his discovering that these people weren't refugees from the *National Enquirer*, but had consistent stories to tell. And he wrote *Abduction*, a landmark book.

Drs. Pons and Fleischmann noticed an anomaly with palladium that had been ignored. They upset the hell out of the physics establishment, the oil, coal, natural gas, and power industries, with their discovery of the cold fusion reaction. Big money finally put them out of business, delaying the demise of OPEC and the coal companies.

Michael Cremo's *Forbidden Archeology* is a compendium of artifacts archeologists have dug up for which there is no comfortable explanation. Like a gold chain embedded in a 300 million year old lump of coal.

The history of science is a long history of the establishments of the day doing their best to keep new ideas from gaining ground. Ditto the medical field. And ditto just about any other field.

And stop complaining about greed ruining things. Greed is here to stay. It's what capitalism

is all about. The alternative is socialism, and that approach has failed every time it's been tried. Instead of fighting greed, figure out how to use it to your advantage.

Greed is everywhere. Look at any square inch of ground, on land or under water, and you'll find there is a constant battle going on for territory. Dandelions are greedy as hell. They do their best to take over your lawn. You either have to fight them constantly, or relax and admire their beauty.

Of course there's always the sheep approach, as long as you don't mind being fleeced regularly.

Will the mark you leave in the world be only a cipher?

### New Energy Source!

The scientific world was rocked recently by the discovery of a new energy source ... sonoluminescence.

Sonoluminescence, wow, what a surprise! Well, a surprise only to physicists with their heads in the sand.

I've published six articles on the subject in my Cold Fusion Journal, with the first, a six-page article, being published eight years ago.

The article was a report on the Jim Griggs' hydrosonic steam generator in Atlanta, which my editor measured at 160% efficiency.

Jim had come up with a new way to generate steam to heat buildings using the sudden compression of water. When his customers started measuring the efficiency of their systems they were amazed to find them more than 100% efficient. I heard about it and quickly sent an editor to Atlanta to make careful measurements.

Jim got a patent on his system in 1993 and I published the first article on this amazing new energy source in 1994. Since then I've published scientific papers explaining the science involved in sonoluminescence. I published another article on using this technology to propel boats without the need of any propellers. The inventor got a patent, but never was able to

get any boat companies interested in it. Inventors just don't seem to be much good at marketing their ideas.

Jim uses a wheel with little dimples in it, running inside an outside casing which is only thousandths of an inch larger in diameter, thus suddenly compressing water sprayed onto the wheel to make steam. The compression was generating little bubbles heated to thousands of degrees, resulting in a micro hot fusion reaction.

### Your Pets

Is there any real question in your mind about dogs and cats having digestive systems geared to handle raw meat? You know that's what they've been eating for a million years — up until some enterprising companies made it "easier" for us to buy cat food and dog food from supermarket shelves.

I'm a dog and cat person, but it never occurred to me that my pets should be fed raw meat. The pet food company commercials told me that their food was scientifically designed to be what was best for my pets. Duh. Wrongo, that stuff is what is best for the pet food companies.

Now I've discovered that many scientists have researched the subject and found that when you feed your pets cooked food they generally live about 65% as long and suffer from human ailments.

It was this fact which got Dr. Bruno Comby to start putting his sicker patients on raw food diets. The results were spectacular. His book, *Maximize Immunity*, is reviewed in my *Wisdom Guide*. He, like Dr. Lorraine Day and several other doctors, has been curing his patients of cancer, AIDS, and just about any other illness.

If your pets have been raised on pet food, it may take some time to get 'em used to raw meat. I suggest you invest in some beef liver, mince it, and mix it in with the stuff you've been feeding your pets. It won't take long before

they'll come running when they hear the chow call.

You can help keep them healthier by adding some silver colloid to their drinking water. They'll also have better breath as a result. They'll also stay healthier if you spray them with silver colloid every couple of days.

Keep some silver colloid in a spray bottle around for your plants. Flowers will last a week if you spray them. Spray grapes, too.

A reader says that if you spray a sore throat every ten minutes for a couple of hours, it'll go away.

When you have visitors, spray the silverware and glasses they've used to get rid of any germs.

How do you make silver colloid? Simple, you stick some pure silver in water, apply a few volts, and there it is. Since pure silver is difficult to find, I've invested in a big roll of #10 silver (99.999% pure) wire and will chop off a couple of 5-inch lengths for you for \$15, plus the usual \$3 shipping and processing. See the Radio Bookshop ad on page 63.

### The Invasion

D'ja notice that Los Angeles now has more Latinos than whites? And it's estimated that by 2016 the same will hold for California. Mexicans are pouring into the U.S. at over a thousand a day, and most are settling in California and the southwest. Mexico is gradually reclaiming what used to be theirs.

Unlike previous immigration waves, relatively few Mexicans have shown much interest in adopting our language or being assimilated as just plain Americans after a generation or two.

### Helping Africa

Any American blacks who know much about Africa must be ashamed to be called African-Americans. Africa is a basket case. The whole continent. Sickness, poverty, famine, dictators ... the works.

Continued on page 59



# Build This Commercial-Quality Counter: Part 1 of 2

*Amaze your friends — and yourself!*

*Would you be interested in a frequency counter that is immune to the effects of temperature and aging? Well, I guess we are! Do you need to take out a bank loan to pay for this little bench instrument? You bet you don't! Using all new components and printed circuit boards, it will cost you less than \$130!*

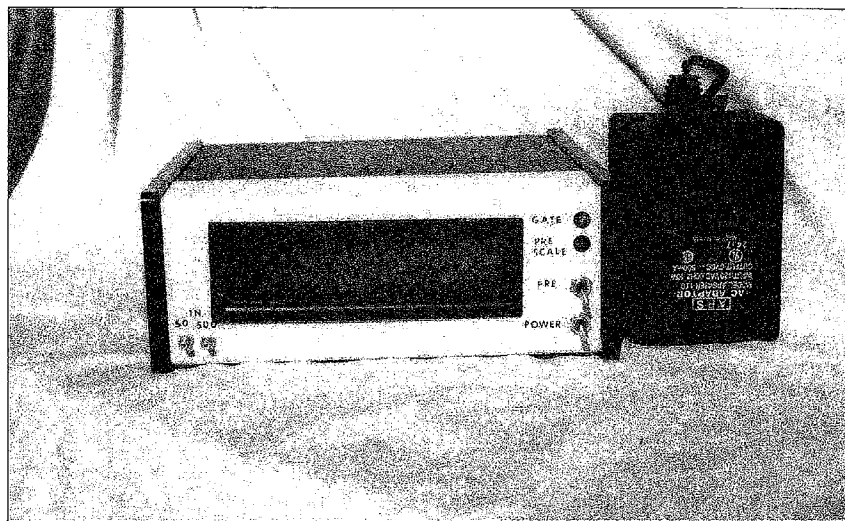
**T**he cost of the Ten-Tec® enclosure, printed circuit board(s), and displays, represents about 75% of the cost of the unit. I am a believer in making the best I know how to and then adding a nice enclosure so that it looks as good as a commercial unit. This instrument does look commercial if you use the rub-on decals and seal with polyurethane spray.

Let's outline what you are building since we know all about the specifications of

the commercial units, especially in regard to the crystal time base and displays. No attempt has been made to cheapen this unit. An absolute digital calibratable time base is used along with CMOS (silicon gate) digital devices to minimize heating effects and maintain long-term threshold stability. Both the 4000-series metal gate and the 74HC silicon gate devices are used to their characteristic advantages. The VHF/UHF prescale circuit is from the

cellular telephone industry's latest devices using surface mount (SMT) technology. These are silicon gate linear and digital devices using very low current with tremendous toggle speeds. The extremely low prices are especially attractive. A prescaler costing one-tenth the price of the old ECL device 11C90 plus using one-tenth the power is extremely nice! With a small wire as an antenna, you can measure your transmitter frequency in the 500 MHz range with no problem. The prescaler is switch-selectable from the front panel.

If there is a negative to the design, it is the cost of the displays. These are hybrid devices which have the latch, decoder (TTL) and resistor current limiting on a single DIP-14 logic chip, not to mention the dot matrix LEDs which give a very bright dot character display. The negative is that they can draw from 60 to 100 mA each. This is about 900 mA for the whole counter at 6 VDC. I used a \$4 wall converter unit which is specified at 6 VDC 800 mA regulated. This is the most inexpensive way to put power in to the unit at a low price, not to mention keep the 120 VAC line out of the enclosure.



*Photo A. The K8IHQ high-performance frequency counter.*



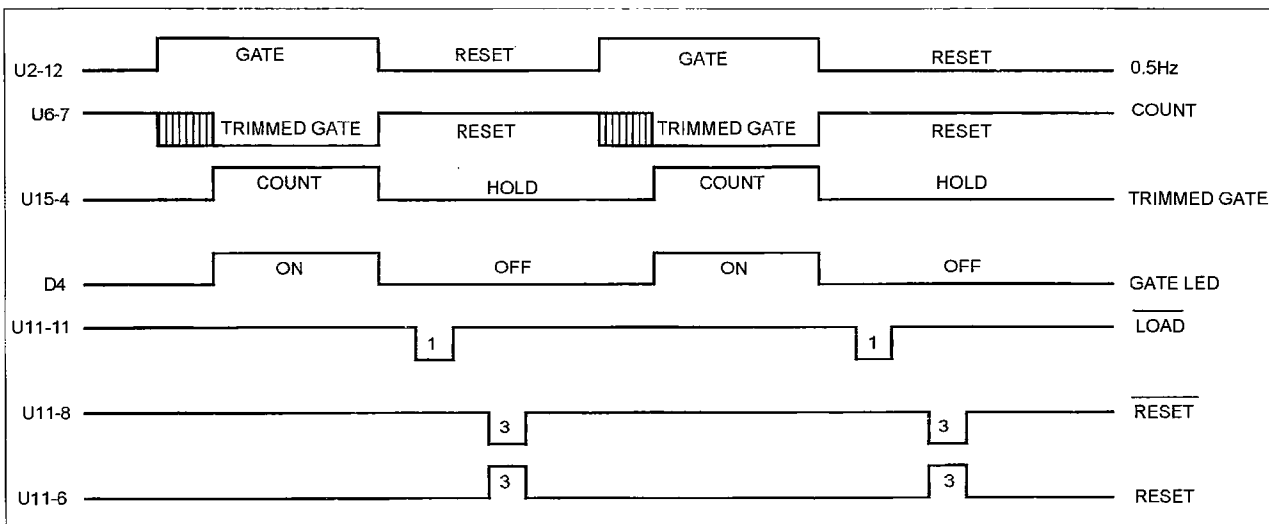


Fig. 1. Timing diagram.

There are two sources for the wall unit. I liked the wall converters so well I purchased five of them for future projects. When 825 mA was drawn,

the load of my counter, the output voltage reduced to 5.60 VDC, which is

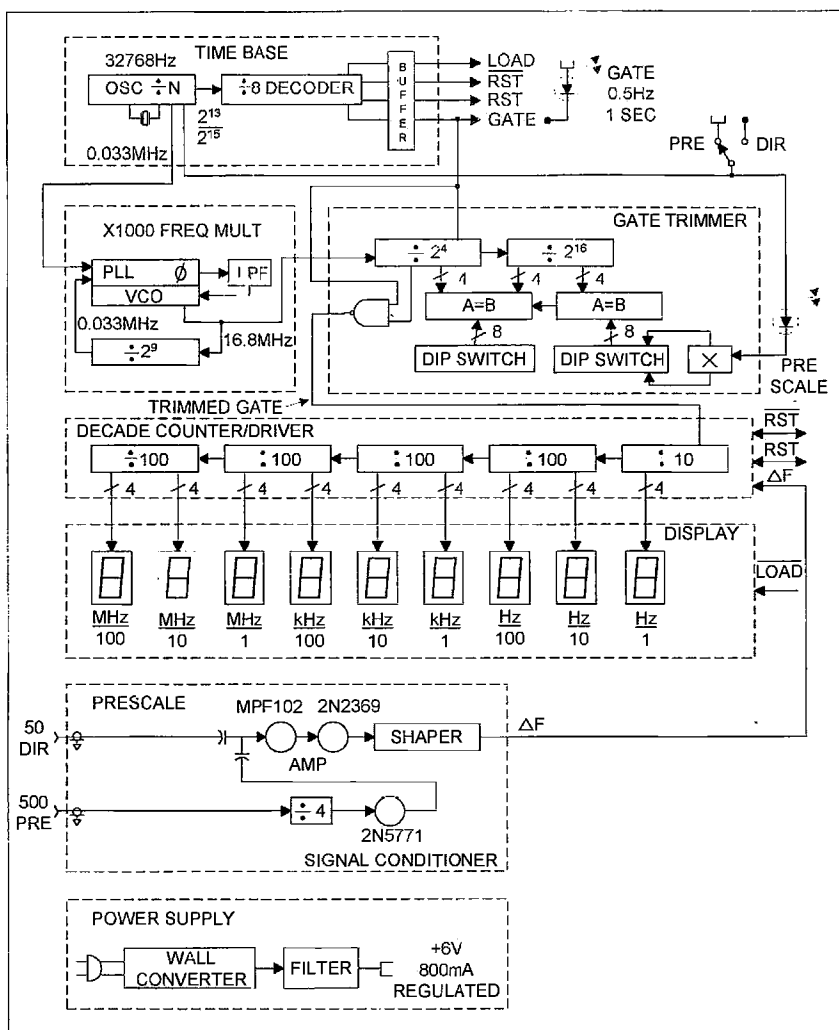


Fig. 2. Functional block diagram.

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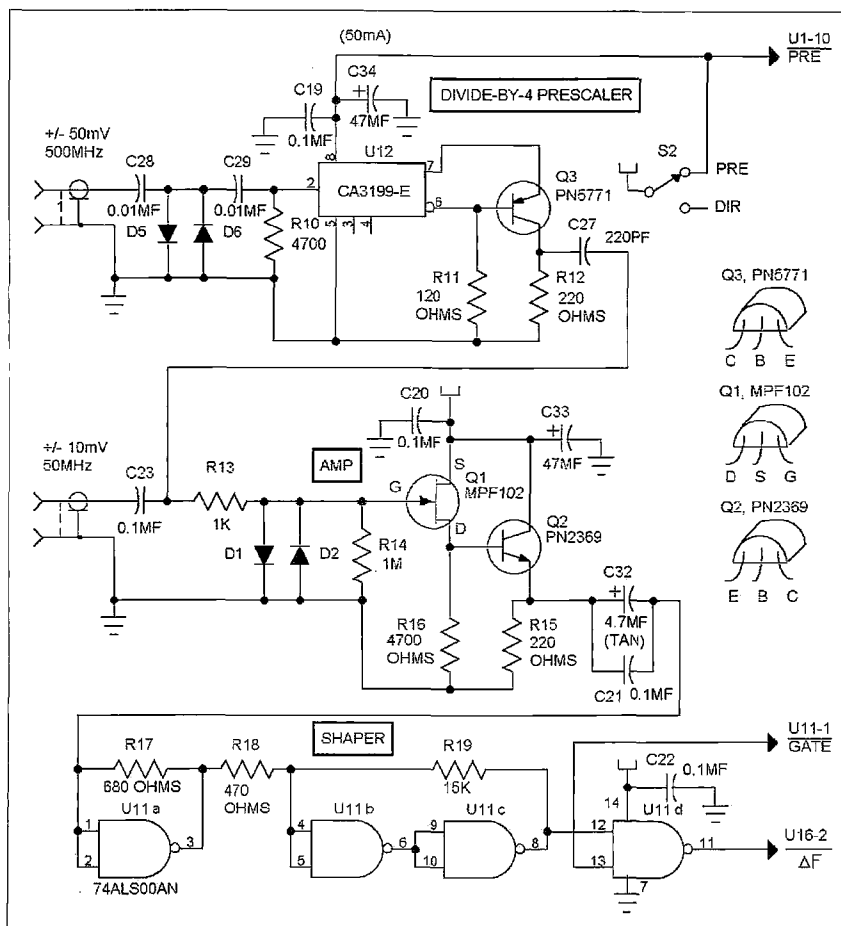


Fig. 3. Signal-conditioning schematic. References: HR, Feb. '78, pg. 28; 73, Dec. '78, pg. 107; Fairchild app. note 95H90. Note: In this article, the use of MF in schematics is meant to indicate  $\mu F$ .

perfect for the logic ICs. When the pre-scaler is not selected, the voltage returns to exactly 6.0 VDC, which is one volt

below the specified limit of the HC logic devices. Everything works fine! The wall converter is UL- and CSA-approved.

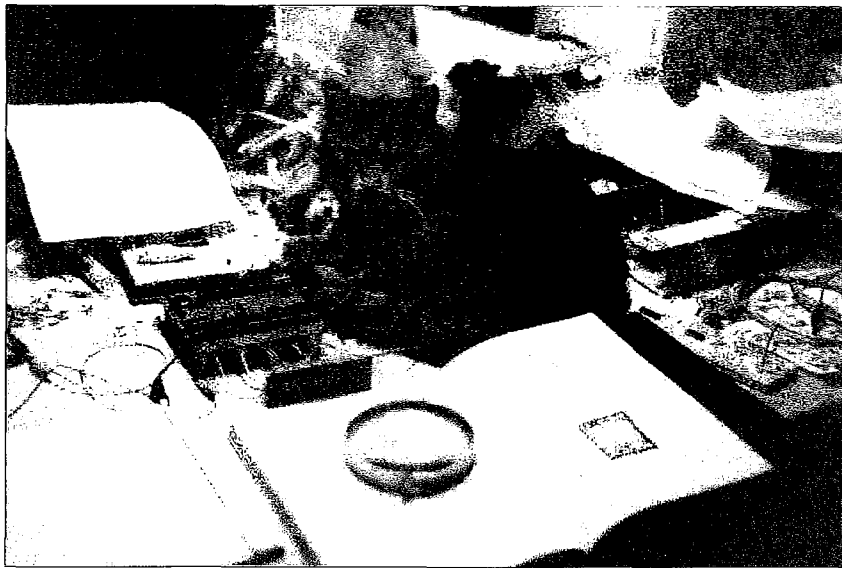


Photo B. The author's little helper.

Then there is the cost of nine HP-5082 OR TIL311 displays. These display devices are about the same in appearance and performance. I prefer the HP devices because three of them fit in a DIP-24 machine pin socket very nicely and are end-stackable for the nine-digit display. But, again, the cost may dictate selection in any case. This article uses the HP displays.

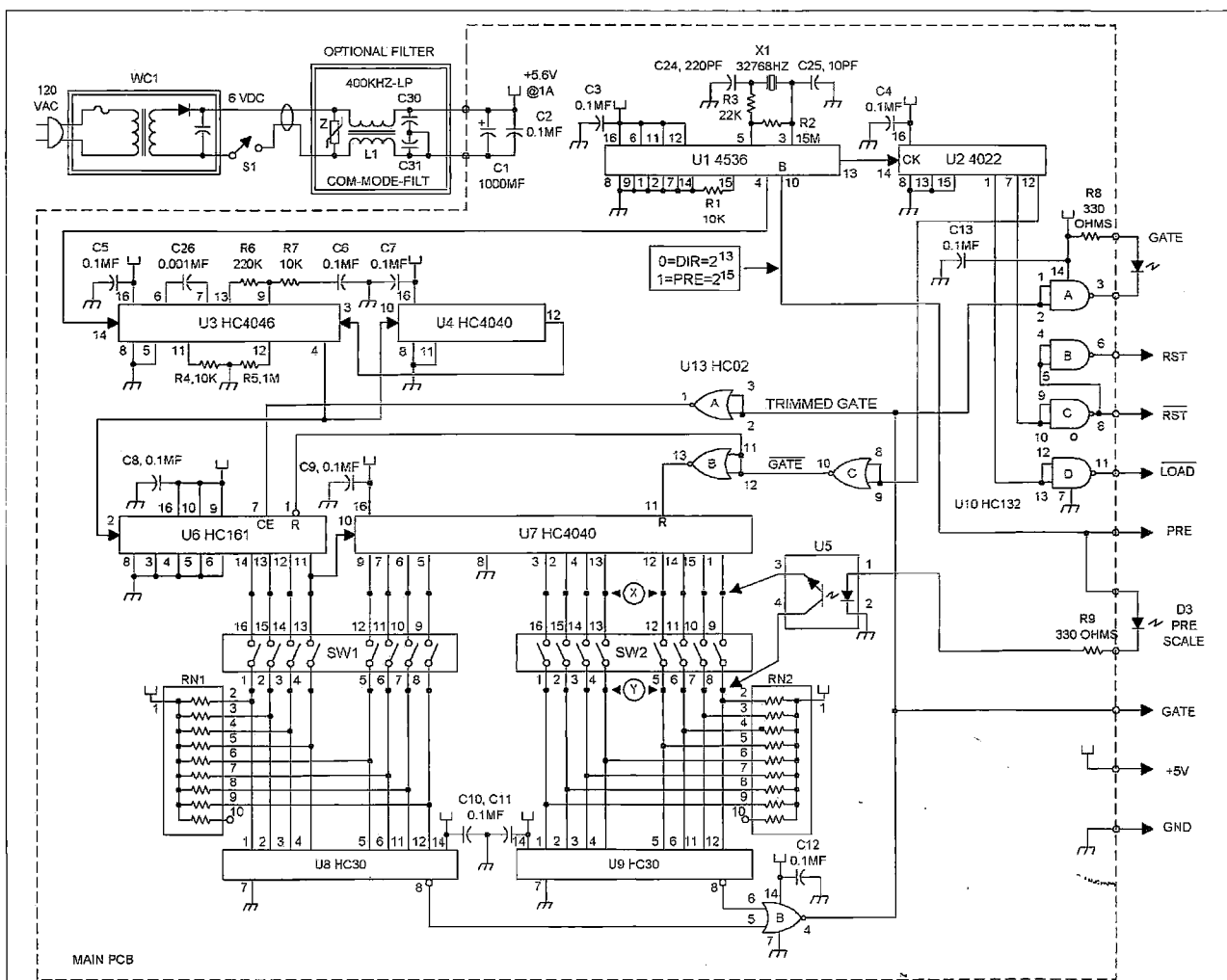
The cost for the TIL-311s is about seven dollars per digit more than the HJ-5082s at this time. Procurement is about the same for each. The TIL-311s are available from Hosfelt and Jameco. The HP-5082s are available from Jameco. Keep in mind that the TIL-311s require a larger bezel which is not available from PMI, the manufacturer. They also use vertically mounted DIP-14 sockets. The printed circuit board set includes PC boards for each display type. I was interested in looks and performance, not price.

The enclosure is a Ten-Tec model JW-7 which sells for about \$14. Again, looks good but a bit expensive. The enclosure footprint on your bench top is about 6" x 7" and stands 2.5" high. Quite a small package for such a complex instrument.

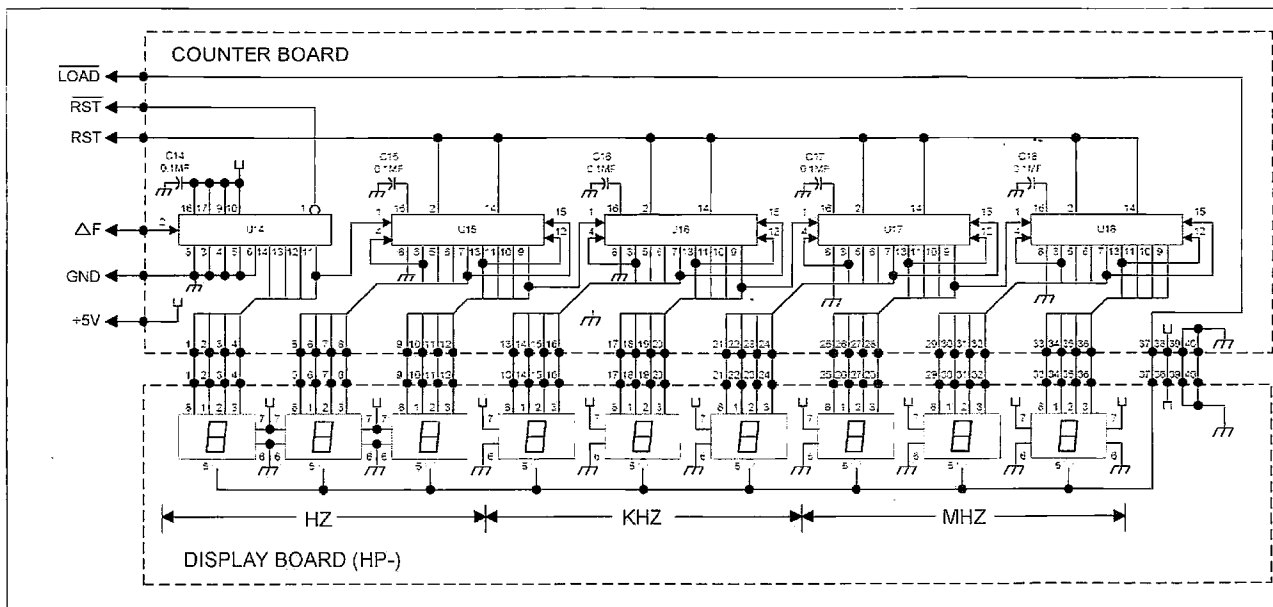
Let's take a look at the front panel controls (Photo A). The bezel is a black polystyrene type made by PMI which is sold through distributors such as Digi-Key at a reasonable price. Use a red lens since the dot matrix displays are already red-lensed. Make sure that the displays touch the lens of the bezel to ensure maximum light transfer. You will also need the masked clear insert which limits the lensed height to match the HP displays. This display is super nice and has no multiplex noise to contend with. I mounted my display assembly using nylon standoffs and clear 100% silicone caulk and allowed it to cure over night. The use of the white nylon screws will also work and look OK.

The LED indicators are clear 3mm types (T-1). They are yellow for gate indication and green for prescale indication. The prescale switch will activate the LED indicator. The power-on indicator is the 7-seg display.





**Fig. 4. Main PCB schematic.** Note: After calibration of the prescaler, the switch position is used to get the same frequency reading as in the "Direct" mode. After that switch position is found to get the correct prescale number displayed, opto U-5 is used IN PLACE OF that switch position. When prescale is selected, the opto compensates for the toggle propagation delay of U-12. The fiddle factor!



**Fig. 5. Counter and display boards.**



# How I Build “Modified Ugly”

*Would you call this “Maui-style” construction?*

*I’m one of those guys who just can’t wait to begin building a project. Waiting for delivery of a part can be the longest part of building a project, and it doesn’t have to be that way! Let me show you how I assemble most of my HF projects these days. It’s simple, easy, even I can do it, and most of all, it’s cheap!*

A couple of years ago, I attended the “Atlanticon 2000 Forum” in Pennsylvania; the New Jersey QRP Club hosted this gathering dedicated to QRP building. Let me tell you, it was a “blast” for a home-brew nut such as me. At this event, the Manhattan style of building was introduced to many of us as a new method of assembling circuit boards. I listened attentively, bought the “punch” suggested for making round pads for connections, and began construction.

This “punch” method works OK, but I like to be able to place items closer together than the pads would allow. The dots created by the punch tended to have an arc in them and wouldn’t lie flat on the ground plane.

There has to be another way, I mused. And with that, I began to experiment with other methods of creating the islands necessary without using the punch method. After several attempts using scissors, cutters, and anything else I could think of, I arrived at the following, and have divided the process into steps.

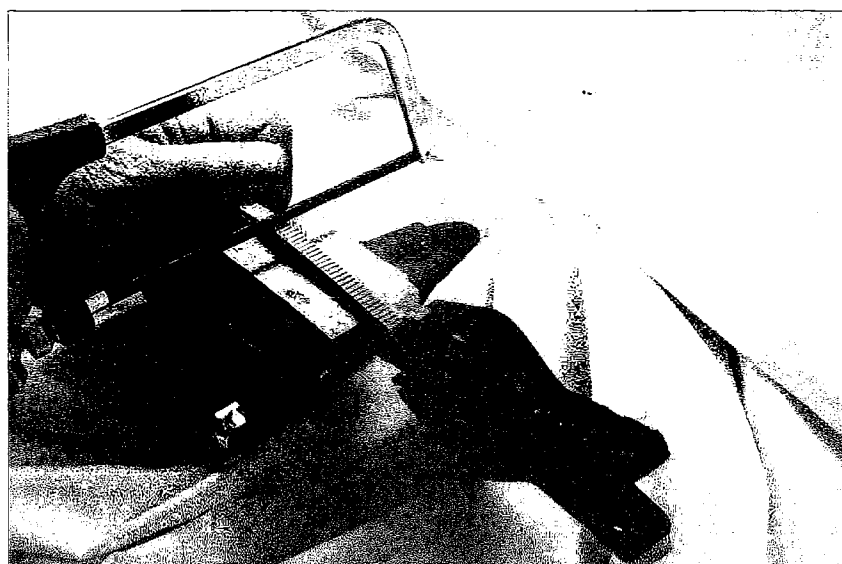
**Table 1** shows a list of the tools I use to work in this style of construction.

## Making strips

The city streets of Manhattan are for the most part straight lines, which form squares or rectangles called blocks. I cut circuit board stock into 5/16"-strips. I used a shear but a metal straight edge and utility knife also work well. Be careful! Red blood cells don’t improve the insulation factor of the board, and detracts from your

Part	Source
mini hack saw, fine teeth	dollar store
spring clamp	dollar store
super glue	dollar store
wire	RS # 278-501, etc.
DIP device (7404, etc.)	your choice
wooden strip for vise	scrap
Pavarotti CD or tape	optional

**Table 1.** Suggested toolbox contents.



**Photo A.** 16-pin DIP being slid along the strip.



work. It also makes holding the tools and parts while wearing a bandage very difficult at times.

After creating several strips, I placed a 1/2"-thick by 1" by 12" strip of wood in my vise, narrow side up. Be sure to leave about 1/4 inch of the wood exposed above the jaws of the vise. This is to protect the teeth of the saw from accidental contact with the vise. Choose one of the cut strips and place it on top of the wooden strip, foil side up. Using a spring clamp purchased at the local Dollar Store, anchor one end of the strip to the wood. Now, slide a 16-pin DIP under the strip, with its legs pointing straight up. DIP sockets haven't worked well here — the indent on the bottom side and the indent on the top allows the stock to slip while being cut. Slide the DIP along the strip until the flexed stock won't allow it to proceed farther. See **Photo A**.

#### Making solder pads

Now for the fun part! Using one hand, press the raised end of the strip

down to anchor the DIP in place. Using a mini hack saw you recently purchased from the Dollar Store, align the blade with the first pair of upright legs, from front to back of the DIP, and complete enough strokes of the blade to remove only the copper foil from the strip. Avoid excessive downward pressure — we want only to remove the copper, not sever the circuit board material.

Slide the DIP down the wood until the last slot is aligned with the last slot cut. Continue cutting until the strip is completed. You should now have a long strip, 1/4" wide, with copper foil segments evenly spaced along its length.

Check each strip to ensure that each cut completely removed the copper foil from the backing. This is especially true along the front and trailing edges. Not keeping the blade level when cutting will allow an incomplete cut on either edge. This will cause two pads to be short-circuited together. My saw blade requires five passes across

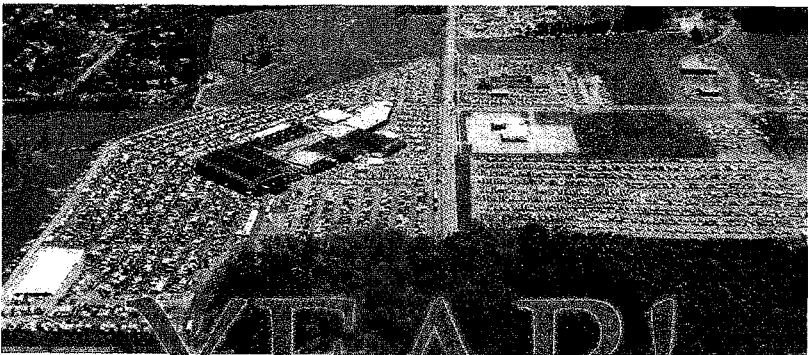
the material to remove the copper foil. Yours may require more or less — it depends on the thickness of the copper foil and the blade being used. Adjust your strokes as necessary.

#### Attaching parts to strips

Let's attach an 8-pin DIP to one of the strips. Using a wooden block to prevent damage to your work surface, place one strip foil side up on it. Using the last four segments, place the DIP on the strip with one leg on each segment. Solder the first leg, and check for alignment of the other three with the strip. When you're satisfied that the strip will be aligned with the DIP, solder the remaining three. **DO NOT CUT THE EXCESS STRIP MATERIAL AWAY AT THIS TIME.** Do the same with the other side. I find it much easier to handle parts while attached to the excess stock.

Now let's try transistors. New devices have nice long legs and are easy to handle. But what about those salvaged

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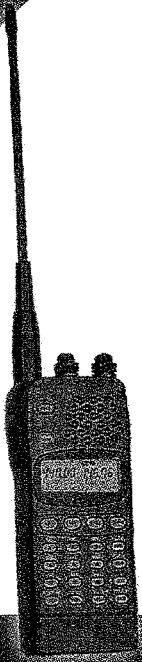
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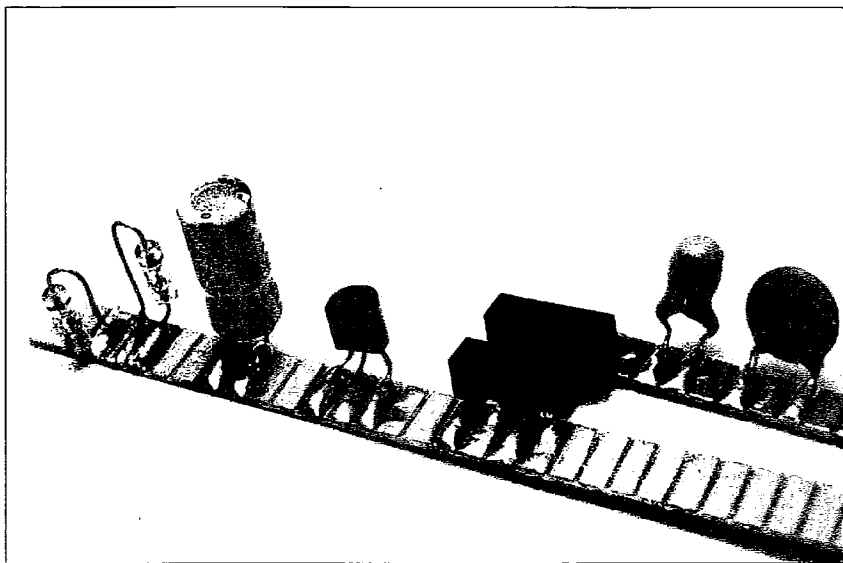
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**Photo B.** This is how your parts will look when properly attached to the strip.

items with the trimmed legs?! They can be a problem.

However, try this. Using "duckbilled" pliers — those with a wide, flat, blunt nose — bend the legs 90 degrees. Tin one segment of the prepared strip and solder the first leg of the transistor to it. Check for alignment of the other two legs with placement on the remaining two segments and complete the soldering operation. Again, don't cut away the excess strip just yet if you have any. Continue attaching devices on the prepared strip. Devices can be "snipped" off the strip using cutters as needed for installation on the ground

plane. Those remaining on the strip are less likely to wander off when attached to the strip. See **Photo B**.

Salvaged resistors, chokes, and diodes adapt well to this process. I always place resistors in one of two positions, either vertical with the color scheme starting at the top and working its way down, or horizontal with the color scheme beginning on the left and completing toward the right. This may sound trite, but I have found that when troubleshooting, not having to think about which end to start on saves time. It also looks darned professional!

Suppose the resistor to be used has

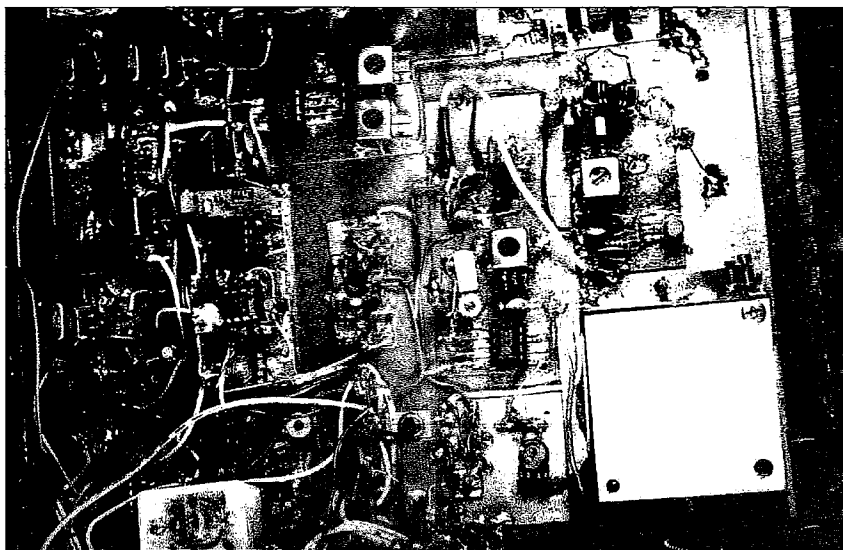
been trimmed and has short leads. No problem! Bend the bottom lead (the one next to the gold or silver band) to form a 90-degree angle. Solder this leg to one solder pad. Now attach a bare wire to the pad adjacent to the one just soldered. Bring the wire up parallel to the resistor, bend it neatly to intersect with the top of the resistor, and loop it once around the top resistor lead. Solder this connection and trim the excess material away. You now have a neat installation utilizing two solder pads and one used resistor. Treat chokes and diodes in a like manner.

### Placing parts

Having soldered various parts on the prepared strips, it's now time to begin placing them on the ground plane. Here's where your imagination plays a major role. I find that it helps to imagine, or picture in your mind, what the circuit is going to look like when finished. Lacking an imagination, use layouts from various articles to see how the professionals placed the items. They have spent time aligning, making short signal paths, avoiding blockages, etc., in their product, so imitate what they have done!

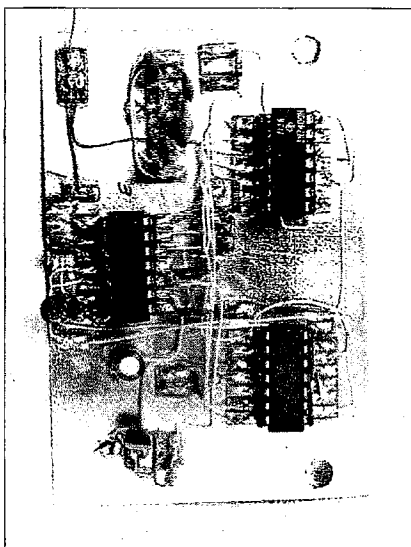
I often use "islands" to form circuits. (Well, Manhattan IS an island, isn't it?) Divide the schematic of your project into its various "subsections." This means take a colored pencil and draw a square around the audio stage, another around the VFO, IF strip, crystal filter, etc. They are usually discernible by the coupling capacitor used to link with the section preceding and the one immediately following. Doing this identifies the various subsections of the project, and shows me the parts needed for that subassembly. Sometimes a section requires a larger island than others. If so, place the parts on circuit board stock "dry," and move them around to find the most effective position. Measure the length and width of the covered space and cut an island this size. See **Photo C**.

There are some advantages to building using the island idea. The entire subcircuit can be moved to a new location, while individual parts would have to be desoldered and moved. Projects



**Photo C.** The author used the "island" method to assemble this circuit.





**Photo D.** The author's Simple Electronic Keyer circuit done Manhattan-style.

can be built in small sections, tested, and then attached to the main board. Repairs or modifications can be done on a removed subassembly, without disturbing the majority of the project. Smaller boards can be placed "on edge" on the main board to conserve space and keep the project compact, but remember to place adjusting controls in the proper perspective! It's difficult, if not impossible, to tune a transformer with the core not facing upwards. (This was learned the hard way, oops.)

**Photo D** shows my version of a project from *73 Amateur Radio Today*, January 2002: "Build This Simple Electronic Keyer" by Craig Sellen. Once the parts are attached to the strips, it's not difficult to adhere them to the ground plane where required. So you make an error or two. Not a problem. Using super glue to adhere the pads also makes it easy to remove them and relocate them. While the glue does provide a good bond between the two surfaces, I find that if I use the tip of a hobby razor knife, I can slide the end under the pad, twist slightly and the pad "pops" off the board. You may have to scrape excess adhesive from the bottom side of the pad before reattaching in its new location, but this is a minor chore.

Super glue is created in several formulas, from instant-acting to one

requiring time to set and cure. Use your soldering pencil to heat one of the already-soldered pads for a brief moment. The heat from the pencil and solder is transferred to the adhesive underneath, and hastens drying time. As always, beware of the fumes expelled from the rapidly curing glue. Proper ventilation to remove the solder flux fumes and the fumes from the curing adhesive is always a good practice.

### Making connections

The location of the device now attached to the ground plane requires appropriate wiring. I use Radio Shack Spin Wrap wire for this. It comes in three colors (red, white, and blue), is plastic-coated, and holds its shape well. Using the tip of your soldering iron, press the end of the plastic-coated wire on a wooden block to allow the heat to melt the insulation from the end of the wire for about 1/8 of an inch. Clean the tip of the iron and solder this tip to the required solder pad. Lay the insulated wire along its required path, making neat turns, if needed, using needlenose pliers, until reaching the proper termination point. Holding the wire at the terminating pad, remove more insulation from the wire and solder it to the pad. Clip the excess wire to complete the connection.

I use the red wire for voltage connections, white for resistor and capacitor connections, and the blue for signal path. This makes checking circuits for accuracy when completed much easier. Ground connections are made with the same wire with the insulation removed.

This process may sound involved at first, but after a few connections the ease with which you can complete wiring becomes apparent. This wire lies flat against the ground plane, can be attached with double-stick tape if desired, and is easily removed and replaced if needed. I have used this heating method of stripping the end of the wire for the past few years, and haven't noticed any damage to the tip of my soldering station iron.

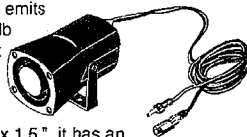
And there you have it! This is much easier and faster than making etched circuit boards, and it's inexpensive. 73

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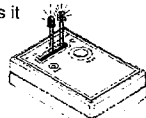
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# Unmasking the Long Ranger

*Measure weak signals up to 56 MHz with this dBm meter range extender, kemosabe.*

*My dBm meter from the November 1995 issue of Electronics Now has been built by many electronics experimenters and hams. It is one of the most sensitive RF meters available, far exceeding simple RF probes for voltmeters. The original instrument is rated for a 2–20 MHz range and is usable to 50 MHz with reduced sensitivity.*

The actual measured sensitivity versus frequency for a  $-30$  dBm input signal is shown in Fig. 1. Note that a  $-30$  dBm signal is quite weak (one microwatt). Most RF probes cannot even measure such a weak signal. The dBm meter, however, can read down to  $-90$  dBm, which is a signal with a millionth of the power of this one microwatt signal — a very weak signal, indeed!

Above 20 MHz, the meter's sensitivity gradually drops off so that by 30 MHz it is down by 20 dB (only 1% as sensitive), and at 50 MHz it is down by

40 dB (one ten thousandth as sensitive) but still usable. Many readers have written asking how to improve the sensitivity at 30 MHz for use with CB and 10-meter-band ham equipment or at 49–50 MHz for use with consumer 49-MHz products or with ham 6-meter-band equipment.

A simple frequency converter circuit can be used to fill in the gap for these bands. The NE602 integrated circuit designed by Robert Zavrel, coupled with some external components, is used in this project to convert these higher frequencies down to the 0–20 MHz range.

Looking at Fig. 2, we see a 36-MHz crystal oscillator and double-balanced mixer convert the 16–36 and 36–56 MHz ranges to 0–20 MHz, where the dBm meter is most sensitive. The crystal oscillator uses a low-cost 12 MHz “microprocessor” crystal on its 3rd overtone. Inductor L1 and variable capacitor C1 are tuned to 36 MHz to prevent operation on the fundamental or any other overtone.

The high output impedance of the NE602 converter is matched to the 50-ohm dBm meter input using a ferrite core transformer, T1. This transformer also establishes a gain of one from input to output of the converter circuit of Fig. 2. See Fig. 3 for the construction details for T1. This transformer also converts the balanced output of the NE602 to an unbalanced 50-ohm load.

At the circuit output there is a 20-MHz low-pass filter with a null frequency of 36 MHz. See Fig. 4. This circuit prevents any 36-MHz oscillator feed-through from actuating the dBm meter. Even though the NE602 is doubly balanced, the balance provides only 40 dB of suppression of the 36-MHz oscillator, so this additional filtering is needed. It

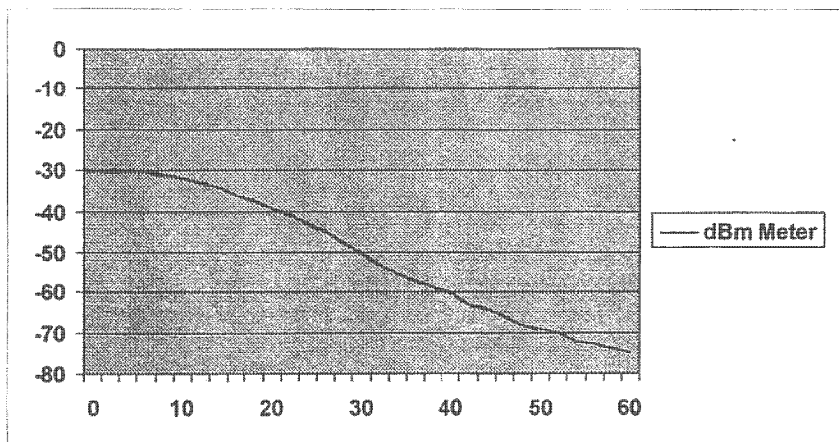


Fig. 1. Frequency response of original dBm meter (MHz vs. dB).



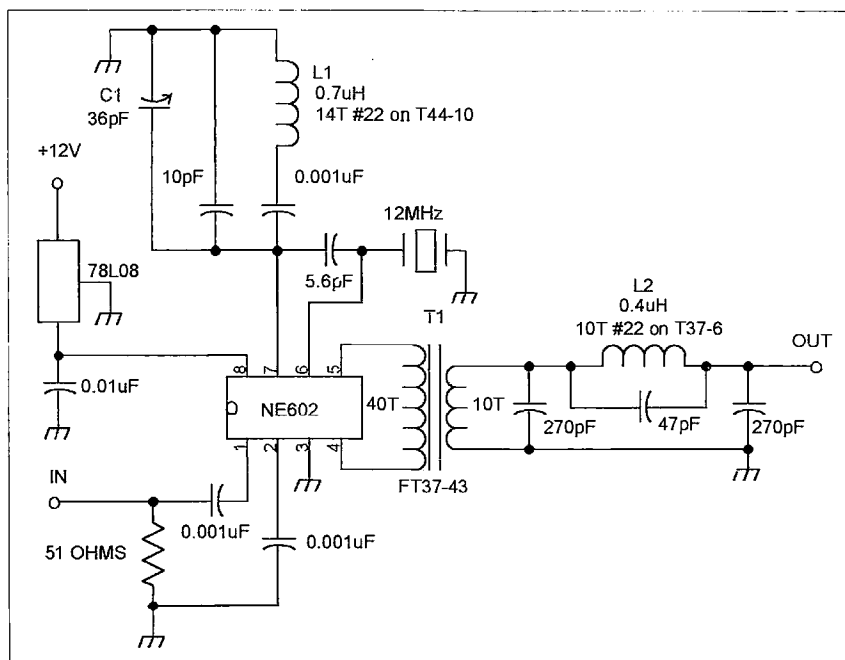


Fig. 2. Schematic of the range extender circuit.

eliminates a steady -80 dBm reading on the meter, which otherwise would prevent reading signals down to -90 dBm.

The measured frequency response of the Long Ranger range extender circuit is shown in Fig. 5. Note how the range extender neatly fills in the response for the 16-56 MHz range. Note: There will be no response within 500 kHz of either side of 36 MHz.

### Building the range extender

All components for the range extender are mounted on the 2" x 2-1/2" circuit board shown in Fig. 6. Note the large amount of copper for the common ground. Positioning of the components is shown in Fig. 7. A kit of parts is available from Unicorn Electronics — see the Parts List (Table 1). The assembled circuit board is shown in Photo A. Note that a great deal of

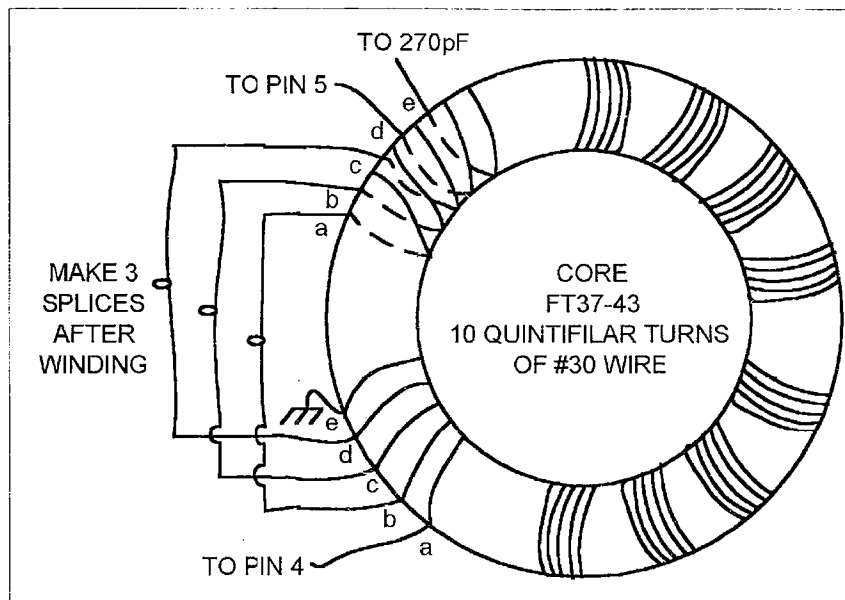


Fig. 3. Winding details for output transformer.

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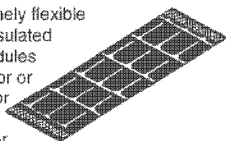
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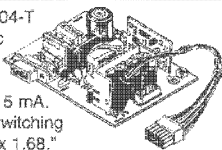


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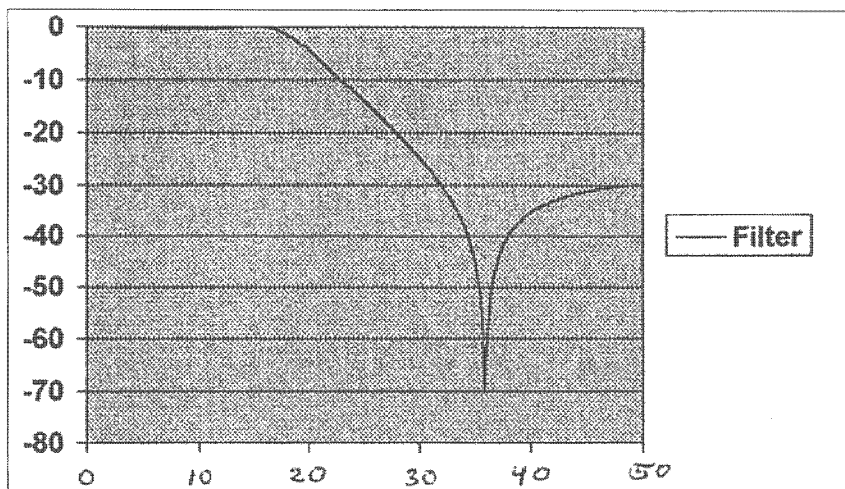


Fig. 4. 20 MHz low-pass filter characteristic (MHz vs. dB).

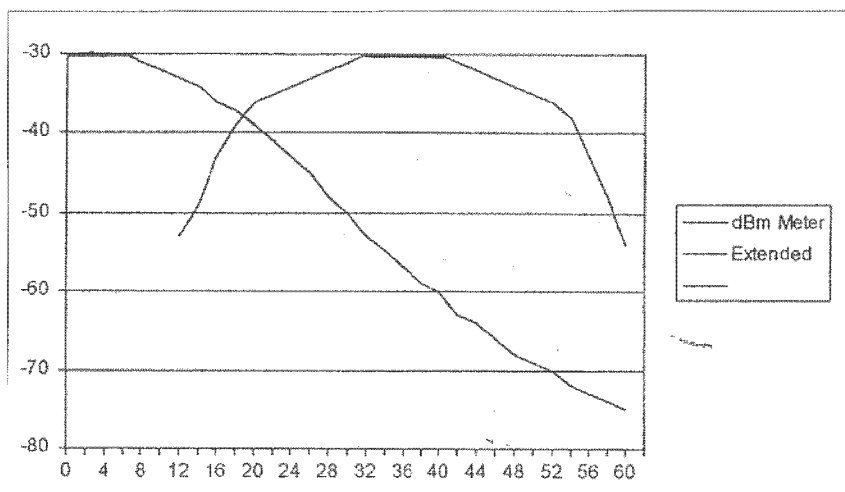


Fig. 5. Frequency response of range-extended dBm meter (MHz vs. dB).

practical information on coil-winding and other components can be found in the Radio Components Manual listed at the end of this article.

## Adjustment and testing

Apply 12 volts to the power terminal. The current should be about 4 mA. Because the voltage is regulated by the 78L08, any supply between 10 and 23 volts is acceptable. The 36-MHz circuit connected to pin 7 will have to be set by adjusting C1. One way to do this is to connect a dBm meter to pin 7 through a 20k ohm resistor. Adjust C1 until the 36-MHz signal appears. The reading will be about -80 dBm. Then set C1 so that the oscillator starts reliably when power is removed and re-applied. The best setting will be to

one side of the point of greatest oscillator signal.

Another way to adjust C1 is to put

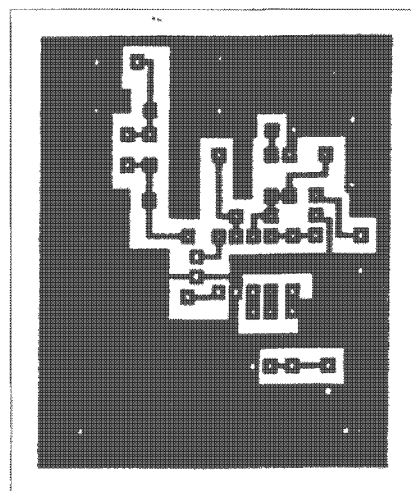


Fig. 6. Circuit board pattern, bottom view.



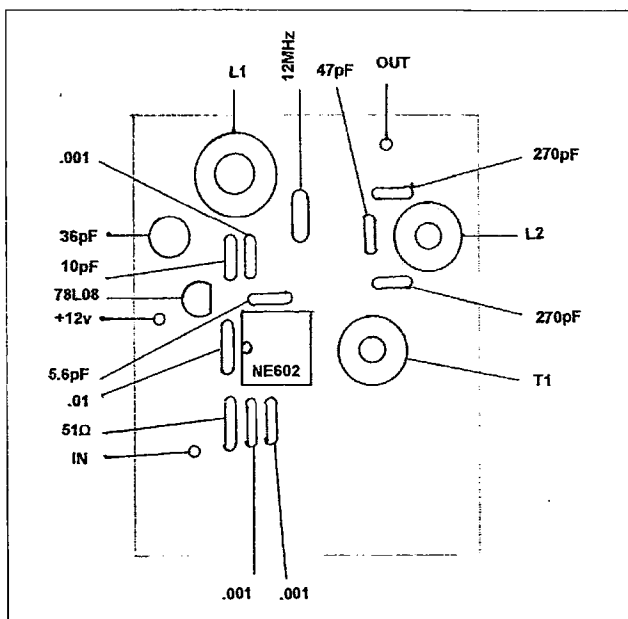


Fig. 7. Component location diagram.

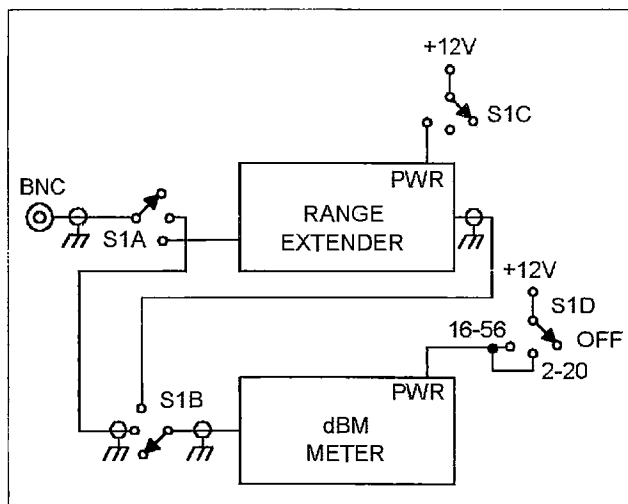


Fig. 8. Switch diagram.

together the test setup shown in **Photo B**. Set a signal generator to any frequency in the 30–50 MHz range. I used an MFJ 249B SWR Analyzer as a signal generator. A step attenuator, such as the one described in the April 1999 issue of *Electronics Now*, can be used to reduce the generator output to the weak levels covered by the dBm meter. Set the step attenuator for 33 dB of attenuation to reduce the MFJ's normal level of +3 dBm to a –30 dBm level. Feed the weak signal to the range extender input and feed its output to the dBm meter. Then adjust C1 for a reliable reading on the dBm. A 30 mV rms signal applied to the input of the range extender should read 30 mV on the dBm meter. You can check this by applying an 18 MHz signal directly to the dBm meter and measuring its level. Then supply this same signal to the range extender and read the output level on the dBm meter. It should be within 1 to 2 dB of the direct

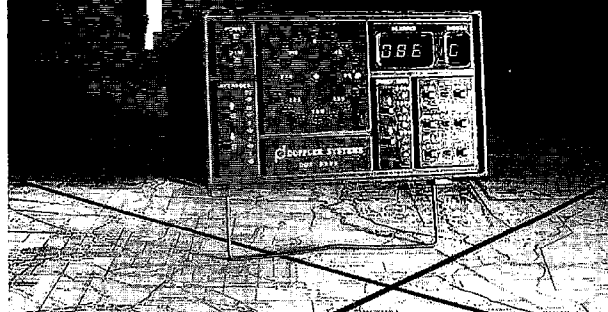
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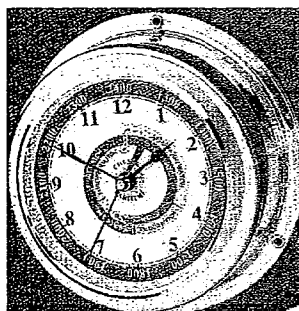
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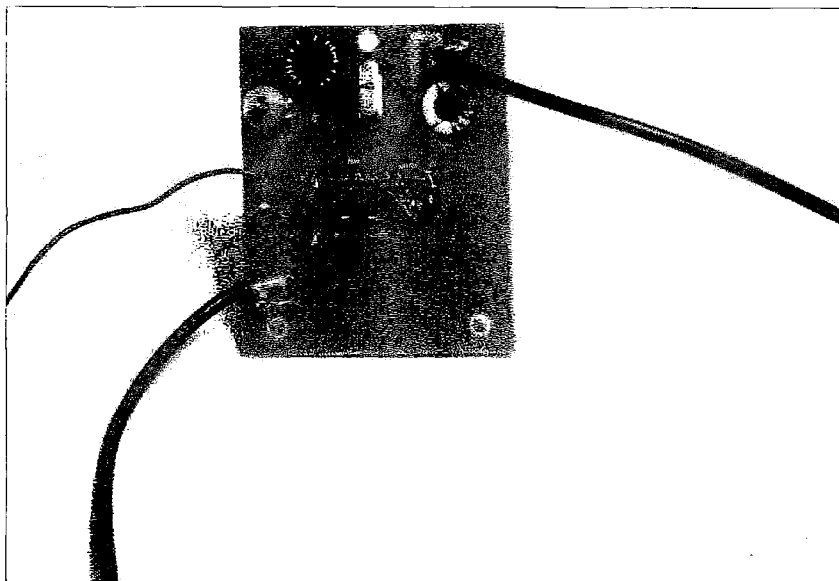


Photo A. Assembled circuit board.

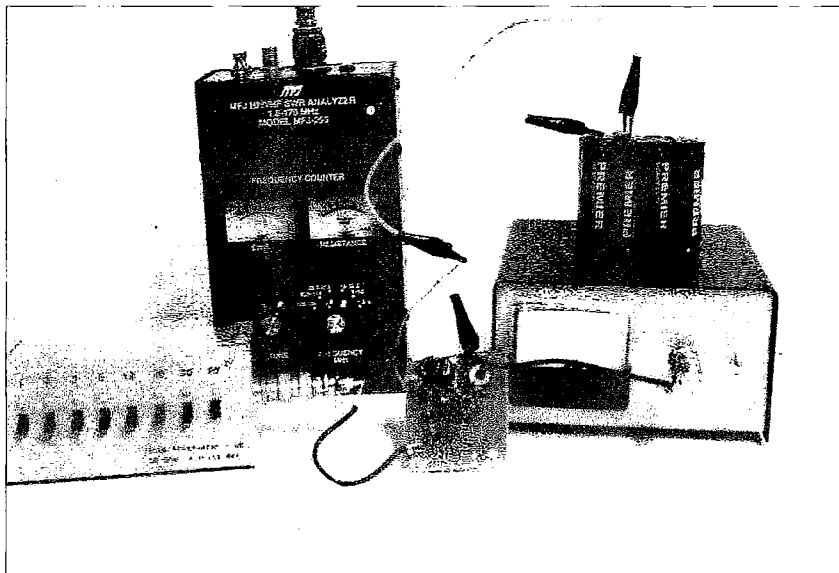


Photo B. Test setup.

Part	Comment
NE602	IC: SA602, SA612, NE612 also usable
voltage regulator	78L08
resistor	1/4W 51Ω
cap, disc ceramic	0.001 μF, 3 needed
cap, disc ceramic	0.01 μF
cap, NPO ceramic	10 pF
cap, NPO ceramic	5.6 pF
trimmer cap	36 pF
cap, ceramic	47 pF
cap, ceramic	270 pF, 2 needed
powder iron toroid core	T44-10
powder iron toroid core	T37-6
ferrite toroid core	FT37-43
crystal	12 MHz
PCB	see note
miscellaneous	#22 wire, #30 wire, RG-174/u miniature coax

Note: A kit of parts including PCB is available for \$16.95 (PCB only, \$4.00) from Unicom Electronics, Valley Plaza Drive, Johnson City NY 13790; 1-800-321-9454; [www.unicomelx.com].

Table 1. Parts list for the range extender.

reading. Note that adjusting C1 will not change the gain of the range extender. It is fixed by the NE602 chip and the turns ratio of the output transformer T1.

### Installing the range extender in the dBm meter box

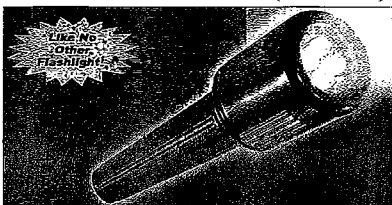
For maximum versatility, you will want to put the range extender in the dBm meter case. Use a switch to select direct operation for 2–20 MHz and range extender for 16–56 MHz. A 4-pole 3-position switch can be used as shown in Fig. 8 to switch the signal connection as well as control the power applied.

The range extender circuit board will fit nicely in the case behind the meter movement. See Photo C.

### Using the instrument

You now have a very sensitive meter for use up through 56 MHz. It can be used to measure signals in receivers, oscillators, and mixers. The passband of filters, including crystal filters, can be easily measured. See

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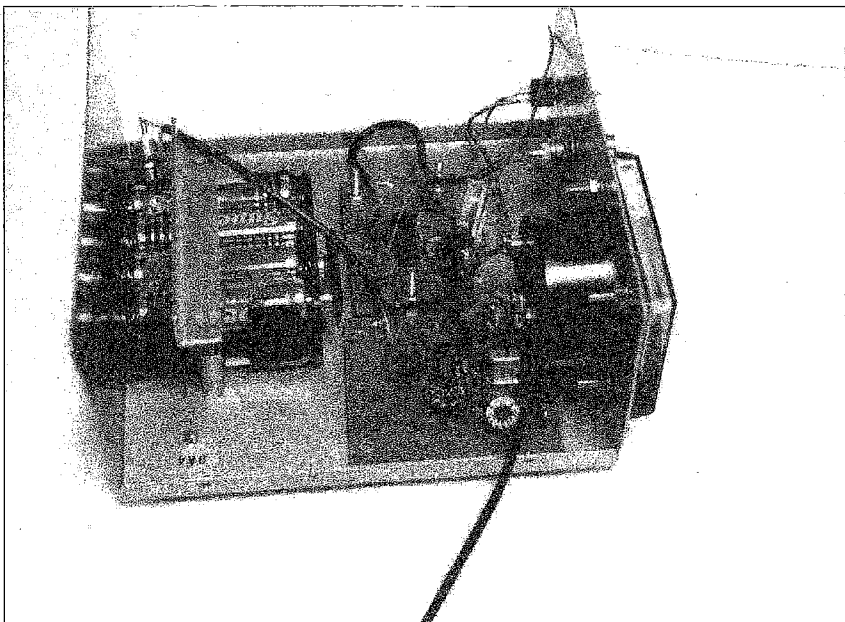


Photo C. Location of range extender in dBm meter case.

the *Ladder Crystal Filters* book listed at the end of this article for details. It can also be used to measure field strength by connection to a whip antenna.

A meter like this can be used to tune a 6-meter antenna for maximum forward gain or to measure front-to-back ratio in dB. Many other uses are possible.

The extender can also be used up through 70 MHz at reduced sensitivity. Overall, it's a very useful instrument to have available.

#### For further reading

1. "dBm Meter," by John Pivnichny, *Electronics Now*, Nov. 1995, pp. 112-113, 158-159.
2. *Radio Components Manual*, by Guido Silva I2EO, MFJ Enterprises, Starkville, MS, 1998.
3. "Build a Step Attenuator," by John Pivnichny, *Electronics Now*, April 1999, pp. 34-37; correction, June 1999, p. 7.
4. *Ladder Crystal Filters*, by John Pivnichny, MFJ Enterprises, Starkville MS, 1999. Available through Barnes and Noble.

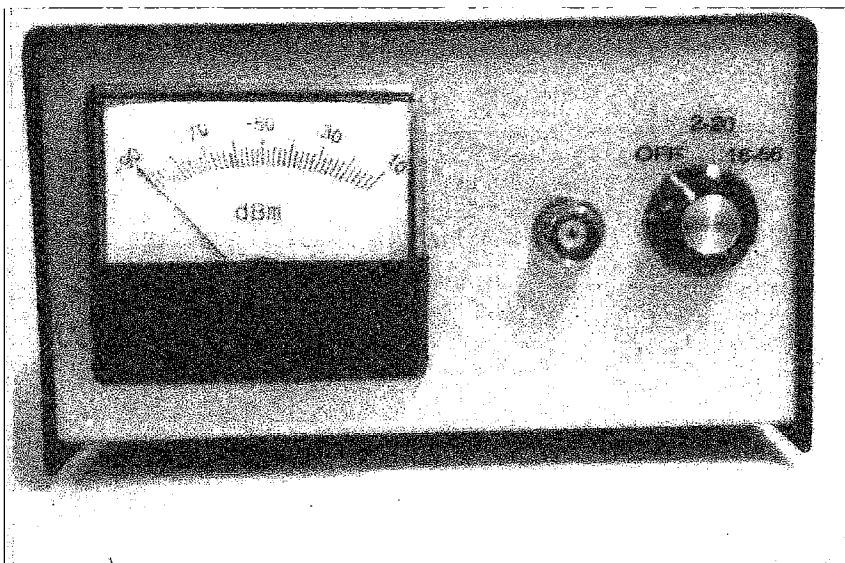


Photo D. Completed unit.

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# Travels with Henryk — Part 4

*All ashore at Malta.*

*I have visited many islands, and one thing I've noticed is the higher-than-average interest in amateur radio on most of them. Malta is a typical example of this phenomenon.*



**Photo A.** Quite a few people show up at MARL for the Sunday meetings.



**Photo B.** This room is for the multimode, multiband club station (9H11MRL).

There are almost 500 licenses issued in Malta, while the population is less than 400,000. The truth is that a large number of these license holders still enjoy CB, as in other places I have visited. The reasons are several: The CB equipment is simpler and cheaper; the number of frequencies available is smaller, so finding particular people on the radio is easier; and using a CB radio is far less demanding than using any ham transceiver.

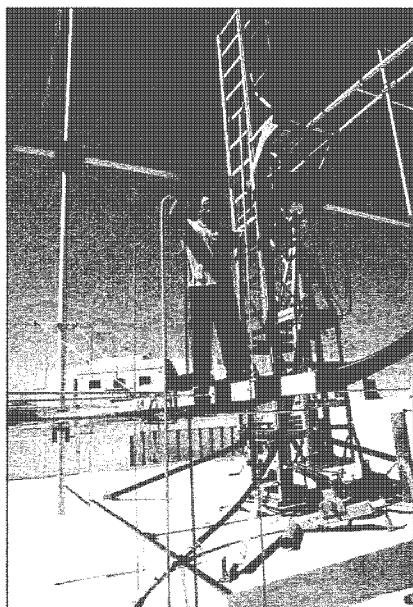
Amateur radio activity is tremendous on the island of Malta. The local organization, Malta Amateur Radio League, occupies a whole property in the central village of Attard (**Photo C**).

A few times a week there are meetings, but Sunday usually attracts the most people (**Photo A**). One of the rooms is devoted entirely to a multimode multiband club station

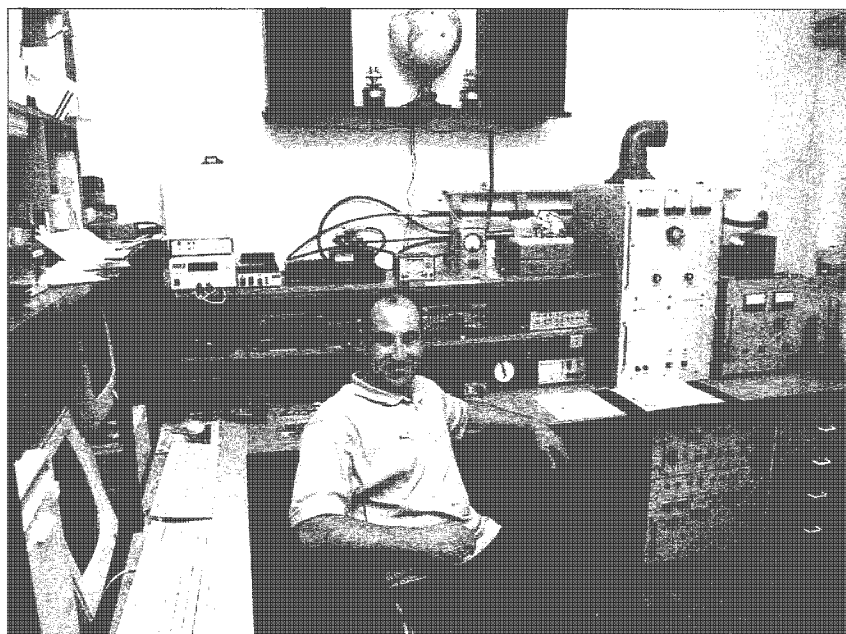


**Photo C.** You can't miss the Malta Amateur Radio League headquarters building. It is well marked, and covered with antennas.





**Photo D.** Philip 9H1PA with part of his antenna array.



**Photo E.** Philip 9H1PA in his shack with his home-brewed gear.

(**Photo B**). Another room is prepared for classes, as upgrading to a full privilege license is in high demand (**Photo F**), among young and older members alike. Carmelo 9H1AQ is responsible for teaching telegraphy and a lot of other things at MARL. Kudos to Carmelo!

In relation to the total number of active amateur radio operators, the number of very advanced 9H hams is

extremely high. I had the opportunity to visit a few of them.

Philip 9H1PA is a wizard of moonbounce and has both an outstanding antenna array (**Photo D**) and a radio shack filled with professionally home-brewed gear (**Photo E**) for 144 MHz and 50 MHz.

He is not the only one with EME ambitions in Malta.

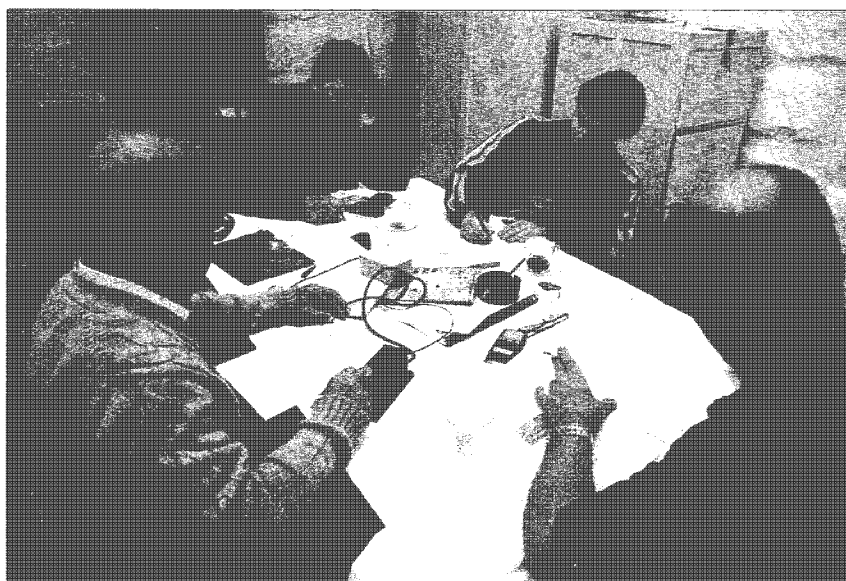
Fortunato 9H1ES is a classical

home-brewer, too (**Photo G**). His main interest is microwave, so you'll see dishes on his roof (**Photo H**).

Paul 9H1BT (**Photo L**) also has experience in moonbouncing. He is an excellent engineer and a versatile operator. He's on VHF, HF, and LF.

Mark 9H1GP is basically interested in HF and climbing his antenna pipe

*Continued on page 26*



**Photo F.** A license class in session. Carmelo 9H1AQ teaches telegraphy, among other things, at the MARL. The exams are conducted only once or twice a year at the Wireless Office.

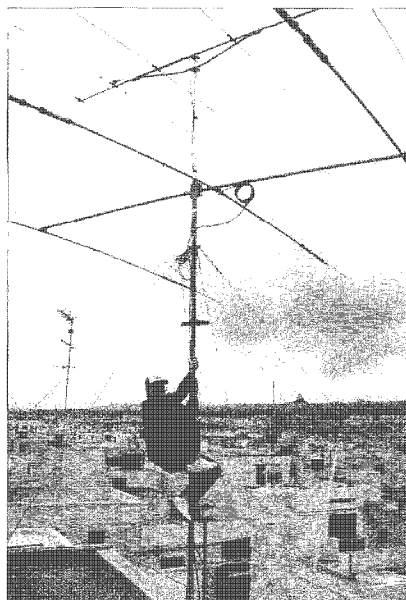


**Photo G.** Fortunato 9H1ES with his home-brew equipment.

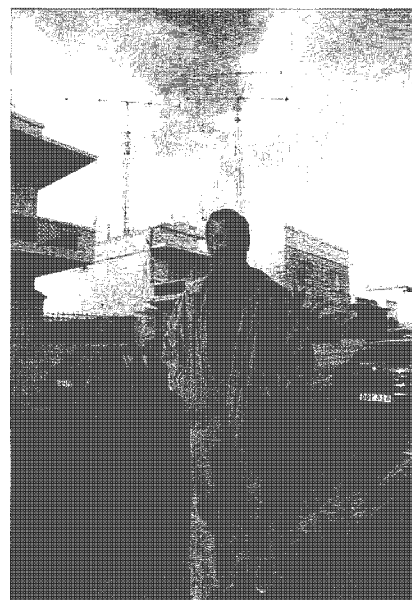




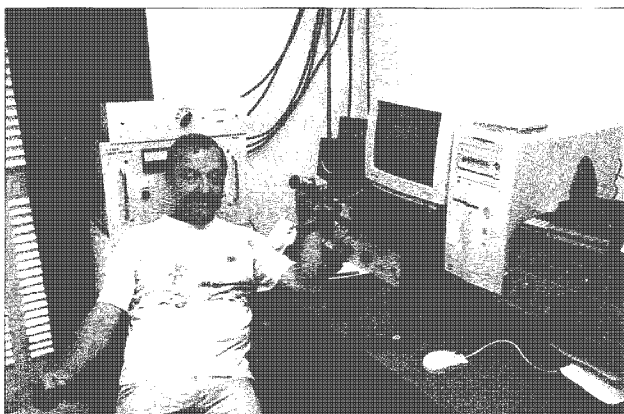
**Photo H.** Fortunato 9H1ES on the roof with some of his antennas.



**Photo I.** Mark 9H1GP of Mosta shows how he climbs his pipe antenna mast.



**Photo J.** Jeff 9H1EL, with his house and antennas in the background.



**Photo K.** 9H1EL has shown his shack to amateur radio operators from all over the world.

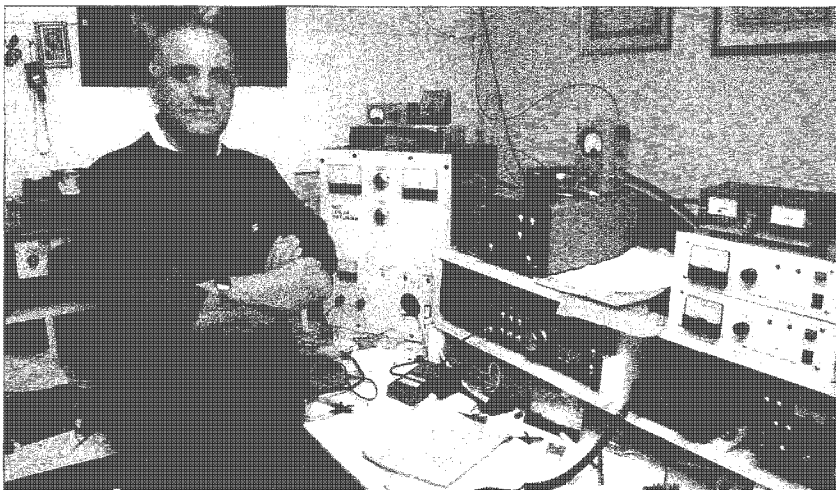
#### Travels With Henryk — Part 4

*continued from page 25*

mast (**Photo I**). ... No, no. I am kidding. I asked him to climb the mast.

The one who is responsible for most of the contest and DXpedition-style exchanges is

Jeff 9H1EL (**Photo J**), here with his house and antennas in the background. Jeff came here from England some 25 years ago, tired of dull Manchester weather. His well-equipped shack (**Photo K**) has been visited by hundreds of amateur radio operators from all over the world, including yours truly. Jeff might be more active in the future, as he has decided to retire from his oil industry work. He usually signs 9HØA in a contest, so now you know! He is a first-class operator on CW, SSB, and digital modes ... but does not care about QSL cards. If you want his card, you'll have to ask his manager in Norway, LA2TO [[www.qrz.com/9h1el](http://www.qrz.com/9h1el)]. 73



**Photo L.** Paul 9H1BT operates on VHF, HF, and LF, and is enjoying some time in his combined shop-shack.

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# Keying to a Different Drummer

*This CW key is simplicity for pennies.*

*This key won't open your house, but it will open the world of basic radio communications. The simplicity of a basic CW transmitter and receiver makes for inexpensive communications. Of course, modern radio equipment and computers offer mind-boggling performance, but at a price.*

**Y**ou may be scared off when you see the prices of good commercial keys, but building your own is an inexpensive solution. The key described is the ultimate in simplicity and it costs pennies.

CW keys are simple devices. They are just switches that turn on the transmitter. The key described here won't key a transmitter directly — even a solid state one. It must be used with a keyer.

A keyer is basically just an electronic power switch that turns the transmitter on and off. The key controls the keyer. When the keyer is a CMOS gate or a MOSFET, the power required for control is minuscule.

Keys take two general forms: the straight key and the speed key. The straight key is a single-pole, single-throw (SPST) switch that is closed by an up and down motion. The sideswiper is the same kind of key rotated 90 degrees so that it is operated with a side-to-side motion. Both have the same limitations of keying speed: Most operators are limited to less than 25 words per minute (WPM) with straight keys.

For higher sustained speeds, a speed key like the Vibroplex "Bug," can send

more than 50 WPM — but they are still just SPST switches. With a speed key, the motion is a rolling side-to-side movement of the hand. Roll your hand to the right to make a string of dots and to the left to manually make dashes.

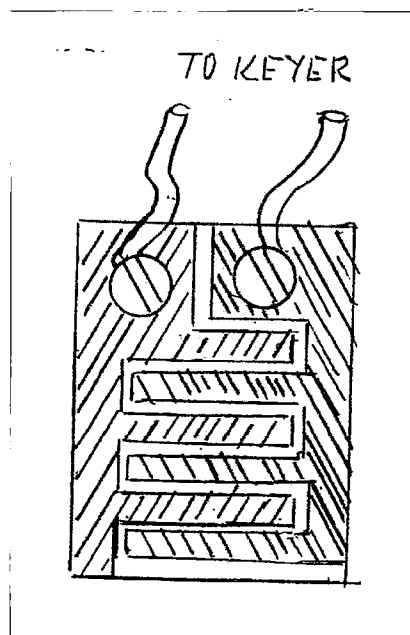
The function of a key is simple — just make a low resistance path to turn on the transmitter or drive the keyer. Keying the cathode of a vacuum tube requires switching a high voltage and current, so the switch must have wider contact spacing and larger contacts. With a keyer, the key only needs to control the keyer. Usually low voltage and low current.

How much spacing do you need? In a benign low voltage environment like a desktop and driving a keyer, a spacing of 0.001 inch per volt is probably sufficient. Spacing will probably be affected more by the operator's personal preferences and operating speed than by voltage breakdown considerations.

Contact resistance is another issue. Switching low voltage and low current, a dry switch, results in corrosion of the contacts of a mechanical switch and a variable high resistance contact. A CMOS or MOSFET keyer can tolerate a contact resistance of 100k, which

leads to just using the contact resistance of a finger for the switch. The hand-to-hand resistance of dry hands is in the range of 20k. The resistance across a finger is somewhat less. This resistance can switch a CMOS or MOSFET keyer.

The key described is intended to



**Fig. 1.** The switch is made from a piece of PC board.



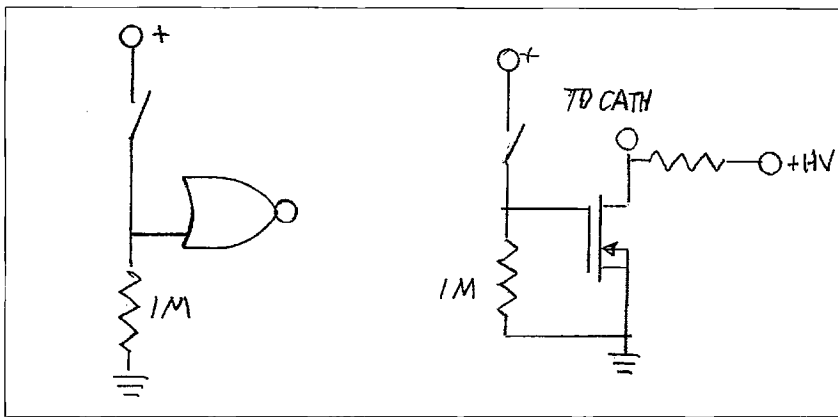


Fig. 2. The switch can drive a CMOS gate (left), or a MOSFET (right).

drive a CMOS gate or an enhancement mode MOSFET. Therefore, the current is a few micro amps and the voltage switched is probably less than 10 volts. The mechanics are the major concern, but even the mechanics become trivial when finger resistance controls the keyer.

Fig. 1 shows a keypad that uses finger resistance as a switch. The keypad is an interdigital pattern on a PC board

with the fingers of the pattern separated by a few mils. The switch is closed when the tracks are bridged by the fingers to turn on a CMOS gate or MOSFET.

Automatic keyers need a DPST (double-pole, single-throw) switch: One side to make dots and the other to make dashes. But if all you want is the equivalent of a straight key, a single enhancement mode MOSFET will do the job.

A novel arrangement I find to be comfortable to use with an automatic keyer has two PC board keypads lying flat and side-by-side and separated by half an inch. One switch is operated by touching with the thumb and the other switch is operated with the index finger. The spacing between the keypad boards is made to suit the dimensions of your hand. Operating the key is about like drumming with your fingers. For a straight key, only one keypad is needed.

The weight of the PC board is very little, and something must keep it in place. I hold mine in place with small screws into plywood and a dot of glue. The screws also provide a means of attaching the leads that connect to the keyer.

The key mates well with a keyer that uses CMOS input devices like the CD4001. CMOS can tolerate pull-down resistors of a meg or more. Since CMOS and MOSFET gates have gate

*Continued on page 57*

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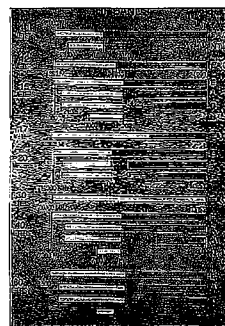
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# Restoring an HQ-140-X — Part 1

*This Hammarlund rig has always been a favorite.*

*Nostalgia! Have you really given any thought to the amount of “love” you develop for a piece of ham equipment?*

**A**fter using a Hammarlund HQ-140-X for many years, it became part of my family, so to speak. It was a piece of equipment that could be counted upon to be dependable and would work any time that it was needed. I don't recall for sure when I obtained the HQ-140-X, but can tell you that once I used it, it was going to be “mine” forever — and it has remained in my possession (see **Photo A**).

My main reason for restoring the receiver, not because I needed it, was simply to see if it was still functional and to compare it to modern equipment. When I last used it, my emphasis for use was with frequency converters that took it up into the 2-meter and 450 MHz bands. I wasn't working SSB at the time, so hadn't developed a “feel” for using the receiver for SSB, though I'd tried it out upon occasion.

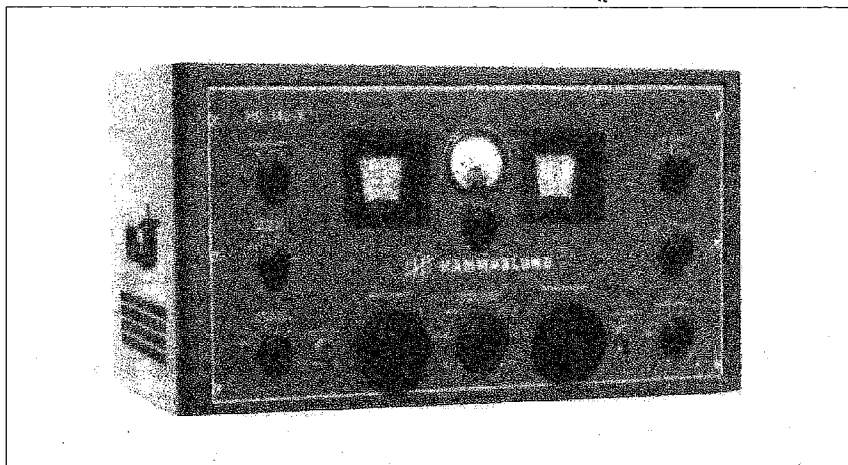
A few years back, I replaced the receiver with a much smaller solid-state radio, but the presence of the HQ-140-X remained in the back of my mind. Eventually I dug the receiver out of its storage location and decided to restore it — not that it ever needed very much other than AC power.

## Decisions

When restoring any piece of old/antique equipment, you have to decide to what extent you will go to complete the restoration. Of concern is a trade-off of your need to have it operate versus the potential market value of the equipment. Therefore, you have to make a hard decision as to how far, or to what extent, you will go to restore the equipment. If the piece of equipment is desired for its functionality regardless of appearance, then most

anything goes to make the piece operate as desired.

If nostalgia is the motivating factor for restoration, then the effort put forth is to enhance the “original” characteristics without modification. In other words, you wouldn't change anything, including the original paint. If the original cabinet was a varnished wood, as an example, the original varnish would be left as-is, though perhaps cracked with age. Maybe a little furniture polish would be used to brighten it up without altering the original finish.



*Photo A. The author's Hammarlund HQ-140-X receiver after it had been restored.*



	Tube Pins							
Tube	1	2	3	4	5	6	7	8
V1 6C4	80k	—	—	—	80k	52k	0	—
V2 6BA6	> 2 megs	0	—	—	73k	78k	298	—
V3 6BE6	52k	107	—	—	74k	79k	114k	—
V4 6BA6	> 2 megs	272	—	—	74k	78k	272	—
V5 6BA6	> 2 megs	263	—	—	74k	78k	611	—
V6 6BA6	3	244	—	—	75k	107k	242	—
V7 6AL5	—	610k	—	—	0	0	275k	—
V8 12AU7	120k	90	1k	—	—	> 2 megs	35k	1.5
V9 6V6	—	—	80k	80k	243k	—	—	383
V10 VR105	80k	—	—	—	80k	—	80k	—
V11 5U4	—	> 60k	—	77	—	77	—	> 60k

Table 1. Resistance values in ohms measured from the tube socket pin to ground.

When nostalgia is the strongest driving force, it's possible that all of the electronic components "must" remain regardless of functionality. In other words, "original" means just that — no repairs that would alter the originality. The equipment becomes a prized museum piece because of its originality.

As for market value, the greatest value stems from the equipment being as close to the original stock condition as possible. Extra holes in the cabinet, modified circuits, new paint, etc., are a turn-off for a person looking for nostalgia or to have the equipment as a "collector's item."

My approach for restoring the HQ-140-X was to do the minimum amount to the receiver to restore it to operation and to maintain the original appearance as much as possible.

### First steps

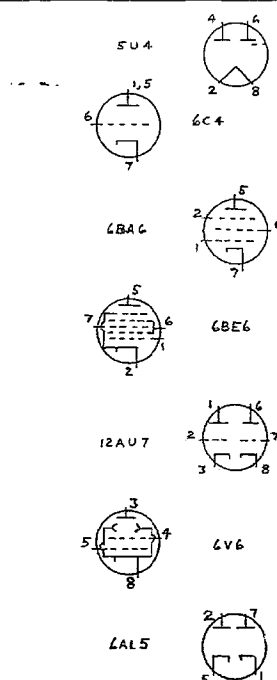
My first step to restoration of the HQ-140-X was to perform a diagnostic evaluation as to its performance to ascertain its health and potential problems. From the results of the evaluation, a course of action would then be planned.

One of the scary things about applying power to a piece of equipment that's been out of service for several years is, What's going to happen when power is applied? Hopefully it will operate and nothing serious will occur. Because of the possibility of an electrical problem, you have to use great caution to prevent damage.

The technique that I used on the HQ-140-X was to place a light bulb in series with the power cord that was plugged into a Variac. OK, the power line and power transformer were now protected, but what if something else happened, particularly in the HV department? How would you detect that condition early enough to prevent

	Tube Pins							
Tube	1	2	3	4	5	6	7	8
V1 6C4	96	-7	—	—	96	—	0	—
V2 6BA6	0	0	—	—	225	105	6	—
V3 6BE6	0	-7	—	—	227	96	0	—
V4 6BA6	0	5	—	—	225	105	5	—
V5 6BA6	0	2	—	—	218	103	5	—
V6 6BA6	0	3	—	—	213	118	3	—
V7 6AL5	0	0	—	—	0	—	0	—
V8 12AU7	—	—	—	—	—	—	—	—
V9 6V6	—	—	276	292	0	—	—	16
V10 VR105	232	0	107	—	107	—	107	214
V11 5U4	—	298	—	280 VAC	—	280 VAC	—	298

Table 2. Voltage values measured between the tube socket pin and ground. All voltages are DC except as noted.





damage from occurring? One way to tell is to watch carefully the 5U4 rectifier for color. Should there be a HV short, the 5U4 will be the first to provide tell-tale signs with a purple glow inside of the plate area. In addition, if the short is allowed to remain for very long and the fuse fails to blow, the rectifier plates will begin to turn red, and then the fuse might blow. It would be desirable to detect the problem before losing a fuse.

A positive sign of proper operation is to observe the purple glow within the gas voltage regulator tube. With the regulator glow present in my HQ-140-X, I had confidence that there was no major shorting condition within the power supply. However, the first hour of operation after a long dormant period is the most critical. Electrolytic filter capacitors are subject to heating until the oxide dielectric within is reformed. Checking the filter "cans" for warmth periodically during the first hour is wise because a sign of heating is not desired. One of the ways of reducing the heating while allowing the oxide dielectric to form is to operate the line voltage at reduced levels with a periodic increase until the normal line voltage level is reached. After an hour of "no filter can" heating, the series light bulb can be removed from the input power line.

Perhaps a better approach to finding a short or potential problem in advance of applying power is to perform resistance measurements. A resistance check/measurement may be made at the socket pins for each tube. **Table 1** shows a general resistance table for most of the tubes in my HQ-140-X receiver. The values shown provide a clue as to what you should expect in a "good" receiver.

To measure the resistance at the 12AU7 tube socket, it is preferred to "pull the tube" so that resistance measurements can be made from the top side of the chassis. It's easier to pull the tube than it is to remove the shield can covering the bottom of the tube socket.

## Diagnostics

My second step was to evaluate the

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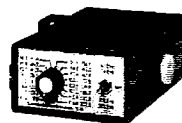
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0.54-1.32	1.30	1.35	0.3	0.3	Bandsread inoperative
1.32-3.2	1.32	1.32	1.0	0.3	"
"	3.15	3.17	3.0	1.5	"
3.2-5.7	3.25	3.25	10	2.0	Bandsread at 100
"	5.50	5.52	1.5	0.6	"
5.7-10	5.80	5.82	0.6	0.25	"
"	9.50	9.51	0.6	0.2	"
10-18	10.50	10.52	0.7	0.2	"
"	17.50	17.52	1.0	0.6	"
18-31	18.50	18.60	1.5	1.0	"
"	30.50	30.60	0.8	0.25	"

**Table 3.** Table of minimum detectable signal level as related to band, frequency, and AM or CW detection mode.

functionality of the receiver in order to profile and/or identify any issues that might need to be resolved.

After power is applied, you must observe the 5U4 rectifier tube and feel the filter can for heating. **Table 2** shows the general voltage levels that I measured at the socket pins of the tubes. Because of the shield can covering the bottom of the 12AU7 tube socket, voltage values for the 12AU7 are not shown.

Although the original HQ-140-X receiver specification did not indicate a measured signal sensitivity level, most

receiver designs of the 1950s era fell into the 2  $\mu$ V sensitivity range. When measuring a receiver's sensitivity correctly, signal-to-noise ratios are the most discriminating and meaningful, but not everyone can perform the test easily. As a simple comparative test, a minimum detectable signal level can be used as a substitute. In this case, a signal-to-noise ratio sensitivity accuracy is traded for the ability to perform "a comparable measurement" using available equipment such as a calibrated output signal generator.

When using this technique, you have to arbitrarily establish a somewhat repeatable point for comparison as a reference for all of the measurements that follow. I chose my reference to be a minimum detectable AM signal that was being modulated at 1 kHz. I also checked the sensitivity for CW signals with the BFO turned to ON. **Table 3** shows the relative signal level measurements that I obtained for the ends of each tuning band (except the lowest band, where I could make a measurement only at the high end of the broadcast band with my equipment). In addition, **Table 3** shows the measured frequency accuracy indicated on the receiver's dial as compared to the calibrated generator. Because the slight offset in calibration was so little, a band set correction was unwarranted, though it was possible to correct.

During the diagnostic phase of my testing, several small problems were noted:

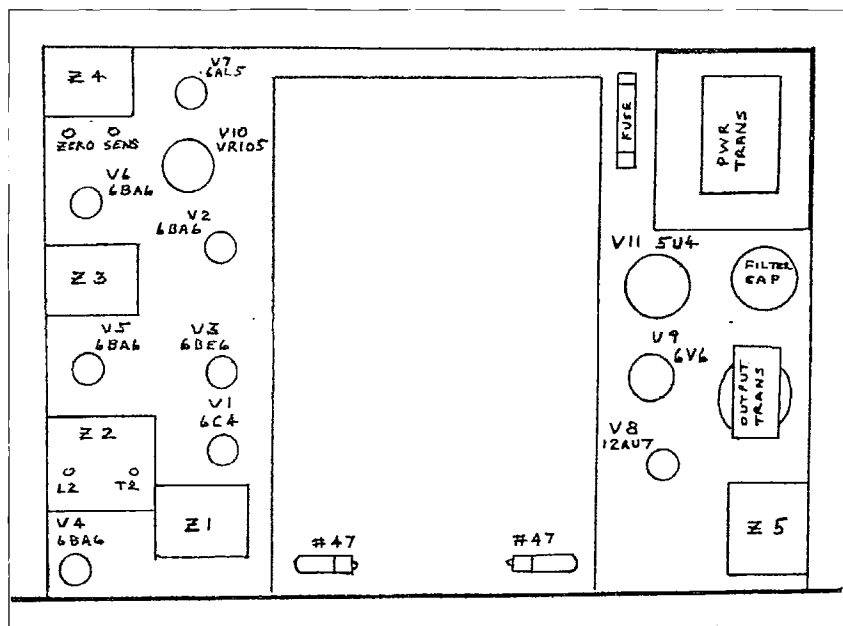
- Very dirty cabinet
- Very dirty front panel
- Dirty/noisy potentiometers
- Dirty/noisy intermittent band change switch
- Noisy tuning capacitor

## Receiver design

Before starting the restoration process, I felt that it was desirable to develop some visual references for the receiver. Mapping it out would help me gain a clearer picture of the design by identifying where all of the major components were located. The first step was to develop a top view layout diagram, as shown in **Fig. 1**, that identifies tube placement and function.

The second step was to work up a form of block diagram, as shown in **Fig. 2**, of the receiver that would assist in understanding the signal flow through the receiver. With this information in hand, I was now ready to proceed with developing a plan for restoration.

Applying power and performing diagnostics on the Hammarlund was an important effort toward the restoration



**Fig. 1.** Layout diagram of the HQ-140-X showing the location of the major components.



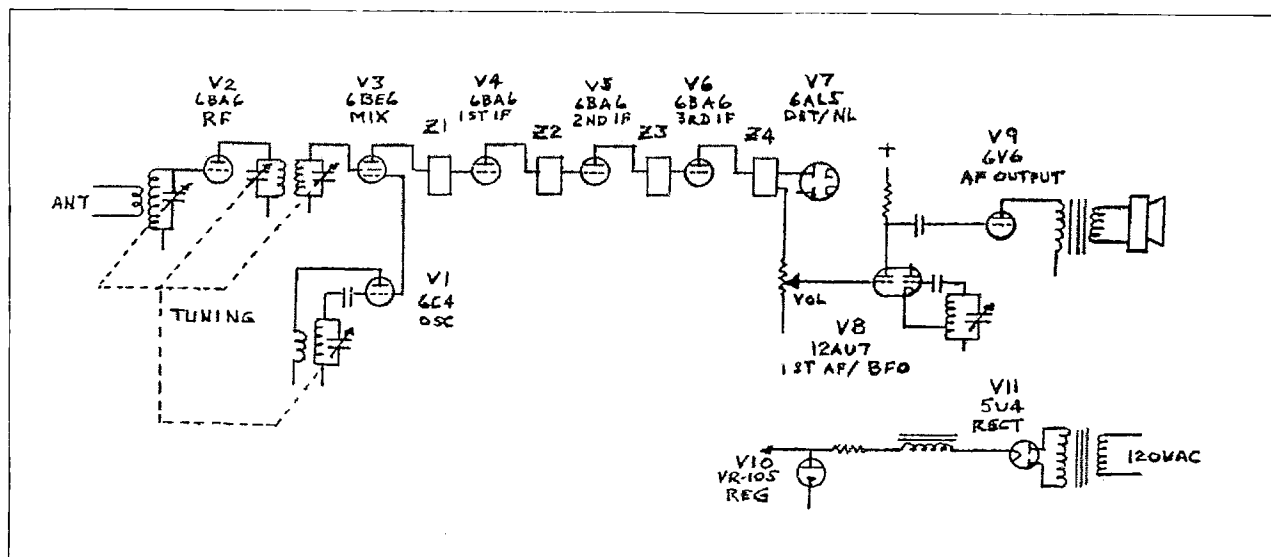


Fig. 2. Functional diagram showing the signal path through the HQ-140-X.

process. The fact that it operated without an electronic problem was of great comfort to me. Now I was ready to proceed to the next step of physical restoration.

To prepare for the physical restoration of my Hammarlund HQ-140-X, the following materials were collected.

#### Material listing

- Dish detergent
- Pledge, Johnson's Wax Co.
- Toothbrush, used
- Stiff bristle brush, nylon or fiber
- Paint brush with the bristles cropped short
- Automobile wax for clear coat finishes
- Paper towels
- Soft cloth
- Small cup for holding the detergent and water mixture

#### Summary

Part one of this series discussed the decisions you have to make before performing a restoration project, and it also discussed techniques that may be employed for applying power to the equipment with minimum risk to the equipment. With power applied, diagnostic techniques were used to evaluate the health of the receiver and to assist in establishing a

plan of action. Mapping of the major components and developing a signal path diagram assisted in understanding the receiver.

Part 2 of this series on the restoration

of my Hammarlund HQ-140-X will begin with the cleaning processes that I used and will touch on using the receiver in an SSB world. Please stay tuned, and 73.

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# Relative RF Power Meter

*Add this handy device to your shack's arsenal.*

*The Relative RF Power Meter shown in Photo A is a piece of test equipment useful for tuning RF circuits to maximum output power. The circuit does not measure absolute power, however; it instead measures the relative output power as the RF circuit is tuned.*

When the meter shows maximum deflection, the output power is peaked. The meter has been tested from 2 MHz to 1 GHz over an input power range of approximately -10 dBm (0.1 mW) to 20 dBm (100 mW).

To use this instrument, the source resistance of the circuit being measured must be 50 ohms.

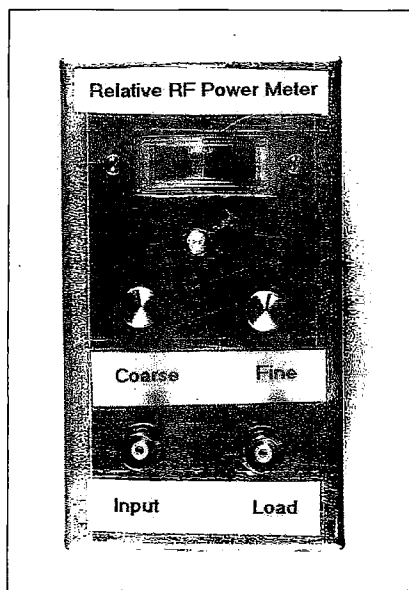


Photo A. Front panel view.

## Circuit description

Fig. 1 shows the schematic diagram for the Relative RF Power Meter. J1 is the RF input. J2 is the connector for the 50-ohm terminator. The RF signal enters at J1, is rectified by D3, and filtered by FB1 and FB2, and charges C1. R11, R10, and R3 form a voltage divider which determines the meter's sensitivity to input power. Overvoltage protection of U1's input is provided by

R9 and D2. The gain of U1 is set at about 200. Offset voltage is eliminated by adjusting R5. R1 and R2 form a voltage divider with the center connection used as a ground. When the meter is turned on, D1 is illuminated.

## Construction

First, drill holes in the front of the case for J1, J2, R11, R10, and the LED clip. Use a nibbling tool to cut a hole

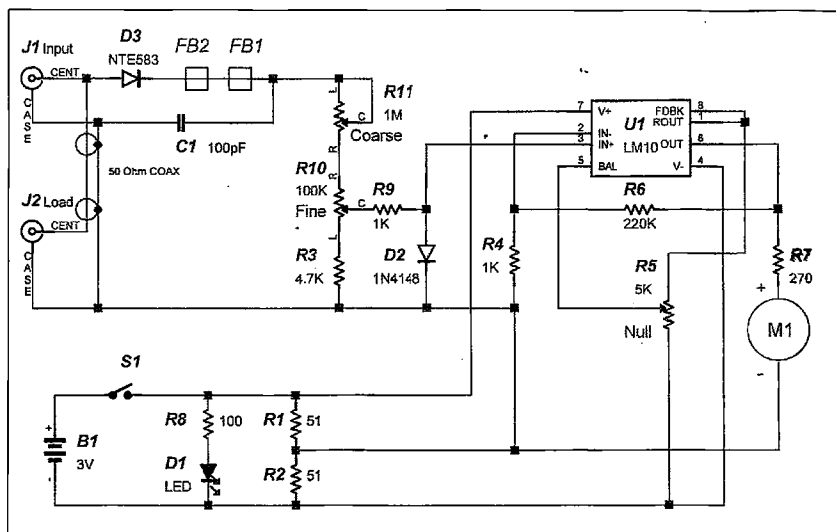


Fig. 1. Relative RF power meter schematic.



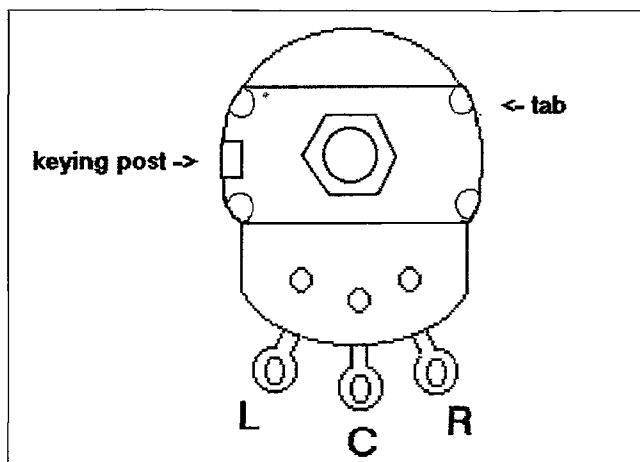


Fig. 2. Potentiometer designations.

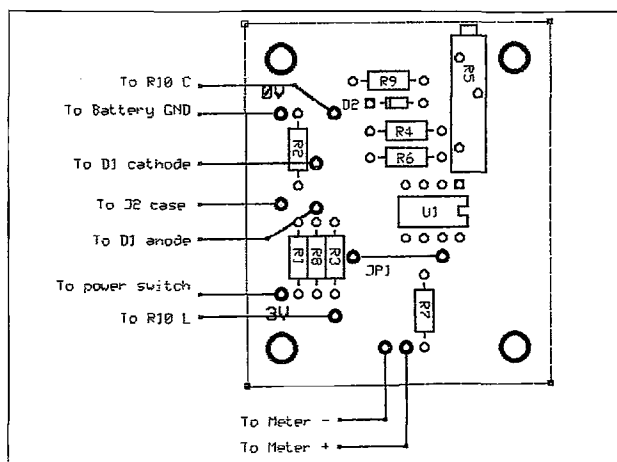


Fig. 4. Parts placement.

for the meter, and drill the holes for mounting it. Next, cut 1.25" of shaft length from R10 and R11. Break off the keying posts with pliers (refer to Fig. 2). Bend the tabs back on R11 and remove its case. Install the potentiometer switch S1 on R11. Mount the above mentioned components in the previously drilled holes.

Use two screws and nuts to secure the meter. Attach the knobs to R10 and R11. Solder J1, J2, S1, D3, C1, R10, and R11 point-to-point according to the schematic diagram shown in Fig. 1. Notice that J1 and J2 are connected with a short piece of 50-ohm coax, and the positive battery holder lead is connected to S1. When connecting D3, be sure the cathode lead passes through FB1 and FB2. Refer to Fig. 2 to determine the potentiometer mounting designations. Keep all connecting leads as short as possible.

Fig. 3 is a full-size positive artwork for making the printed circuit board. When the board is developed, the text "PCF01RFM" should appear on the

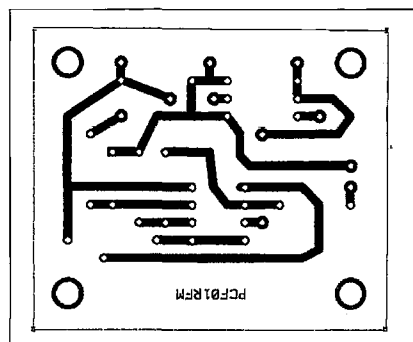


Fig. 3. Foil side of PC board.

Part	Description	RadioShack.com	Mouser
FB1, FB2	ferrite bead	900-5003	
J1, J2	BNC female		161-9323
B1	battery holder 2XAAA	910-0326	122-0421
S1	potentiometer switch	271-1740	
D1	green LED	900-6089	512-HLMP4740
D2	1N4148	900-2908	583-1N4148
D3	NTE583	901-0288	
R1, R2	51 Ω 1/4 W 5%	900-0187	291-51
R3	4.7k 1/4 W 5%	900-0234	291-4.7k
R4, R9	1k 1/4 W 5%	900-0218	291-1k
R5	5k multiturn pot		652-3006P-502
R6	220k 1/4 W 5%	900-0274	291-220k
R7	270 Ω 1/4 W 5%	900-0204	291-270
R8	100 Ω 1/4 W 5%	900-0194	291-100
R10	100k 1T pot	271-092	
R11	1 meg 1T pot	271-211	
C1	100 pF	900-2201	140-50P2-101K
U1	LM10CN or LM10CLN	900-6306	
M1	meter	910-0398	
Case	5.25 x 3 x 2.125 in.	270-238	537-TF-780
Knobs (2)	knobs for 1/4-in. shaft	900-2531	
Load	BNC 50 Ω terminator	910-0557	177-3161
Spacers (4)	nylon 1/2-in. 4-40		561-TSP3
LED clip	LED clip	900-6151	606-CMP22
8-pin socket	socket	900-5740	575-199308
Screws (10)	1/4-in. 4-40		
Nuts (2)	4-40		
50 Ω coax	3.5 in.		
#26 wire	hookup wire		
2-sided tape	adhesive tape		
AAA batteries (2)	batteries		

Table 1. Parts list.



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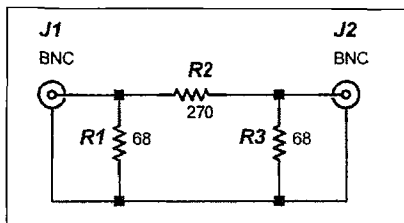
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**Fig. 5.** 20 dB attenuator. R1 and R3 are 68 ohm 10 W carbon composition or non-inductive resistors. R2 is a 270 ohm 2 W carbon composition or noninductive resistor.

copper side, not the mirror image. All component holes are 0.031 inches in diameter. The PCB mounting holes are 1/8 inch in diameter.

**Fig. 4** shows the placement of parts on the circuit board and the wiring connections from the circuit board to the front panel. **Table 1** lists a description of these parts. Use a socket for U1 and don't forget to solder jumper wire JP1. Once the circuit board is assembled and the front panel connections are made, verify the correct orientation of D1, D2, D3, U1, and M1. Drill holes in the back of the case to mount the circuit board, and leave room to mount the battery holder. Attach the battery holder to the back of the case with two-sided adhesive tape. A view of the completed inside of the instrument is shown in **Photo B**.

Insert new batteries and turn on the power by rotating the Coarse potentiometer clockwise. The green LED should

turn on. Turn the Coarse and Fine controls both completely clockwise and null the offset voltage by adjusting R5 until the voltage across M1 measures zero volts. Next, use the four spacers to mount the circuit board to the back of the case.

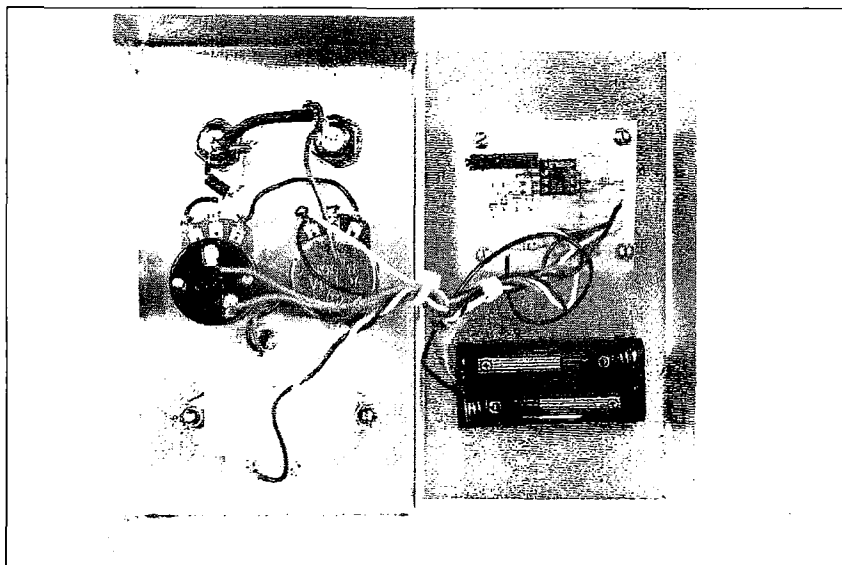
## Use

To use the Relative RF Power Meter, follow these steps:

1. Attach a 50-ohm terminator to J2.
2. Connect an RF input signal to J1 (must have a 50-ohm source resistance).
3. Set the Fine adjustment to 1/2 rotation.
4. Click the power on by rotating the Coarse adjustment clockwise.
5. Adjust the Coarse and Fine controls to center the meter needle. Note: If the meter shows full-scale deflection regardless of the Coarse and Fine settings, the input signal amplitude is too large to measure. If the meter reads no deflection regardless of these settings, then the input signal is too small.

6. Tune the RF circuit for a peak meter reading (if the reading is full-scale then go back to Step 5).

If the green LED does not glow at all when the unit is turned on, then the instrument needs fresh batteries. In order to measure higher input power, simply use an attenuator. **Fig. 5** shows an example of a 20 dB attenuator that, when connected to the input of the Relative RF Power Meter, will allow relative power measurements to 40 dBm (10 W). **73**



**Photo B.** Inside of case.



# Voltage Control for Your Mobile Rig

*Get turned on, and protect your rig in the process.*

*If you have ever left your mobile rig on all night, this article is for you.*

When you pull into the driveway and turn off the ignition of your car, it would be nice if the radio turned off as well. Wiring the ham rig to the same line as the car radio is not a good idea, because the wiring and fuse are not designed to support both. The proper way to connect is to wire the rig directly to the battery with a fuse in the positive line. This means that you must remember to turn off the rig or you

could run down the battery, even if the receiver only draws a small amount of current.

This circuit does that very thing. The relay gets its power from a line that is only on when the ignition switch is on. The relay circuit draws approximately 2/10 of an ampere and should be only a very small strain on any car circuit.

When connecting to the car battery, I like to use shielded cable with the center conductor being about #10 wire. The shield can come from some RG-8 or similar coax cable. Strip off the outer jacket of the cable and then push

back the shield while pulling out the center conductor. No, you don't want

*Continued on page 57*

Part	Value
C1	1,000 $\mu$ F 35 V
R1	22k 1/2 W
D1	1N4001
K1	12 V 30 A relay, RS #275-226
Q1	TIP 120 transistor, RS #276-2068

Table 1. Parts list.

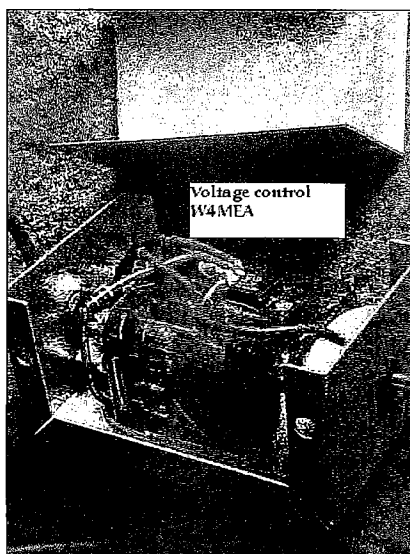


Photo A. Inside the voltage controller.

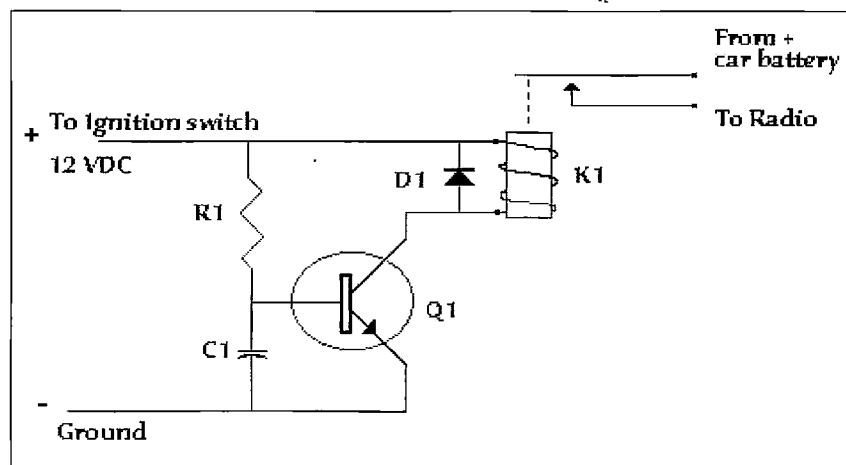


Fig. 1. Schematic.



# An Ounce Of

*Simple tips on upgrading your "radio insurance."*

*Maybe the title got your attention a little quicker than another article about emergency communications, or getting prepared. Since 9/11, there has been a lot written about emergency preparedness, which is as it should be.*

This article will attempt to kill two birds with one stone: (1) standardized connectors in your neck of the woods to cover equipment swapping in an emergency, and (2) protecting ALL your equipment from the hazards encountered with different power sources, be it an emergency or not.

## Power connectors

Getting your group or groups standardized on power connectors is a big

step toward making operations quicker and easier in a stress situation. Usually we have an assortment of RF adapters that can get us to an antenna eventually, but power connectors can become a real problem. The *ARES Field Manual* gives a Power Connector Recommendation on page 68 of the manual. See Fig. 1.

An identical connector is the Radio Shack RS-274-222, which costs 99 cents for a pair (male & female). Molex

rates their current-carrying capability at 12 amps, while Radio Shack rates theirs at 8 amps.

In these days of high power VHF rigs, I believe it would be more prudent to have a higher current-carrying capability as a safety margin. Radio Shack also carries a pair of slightly larger Molex-type connectors in the same configuration, which are good for 20 amps and cost 99 cents each for either a female or male connector. These are made for #14 to #10 wire and will handle most 100 watt HF mobile rigs also. The male version is RS-274-151 and the female, RS-274-154. No matter how small the Radio Shack store I've visited, they have always had these connectors.

If your group's city/county/state can agree to use one standard, there shouldn't be any interconnect problems. In the interest of universal standardization, you might want to make short cables that convert the larger connectors to the ones shown in the *ARES* manual.

## Other hazards

In the stress of an emergency or even in the normal confusion of a large

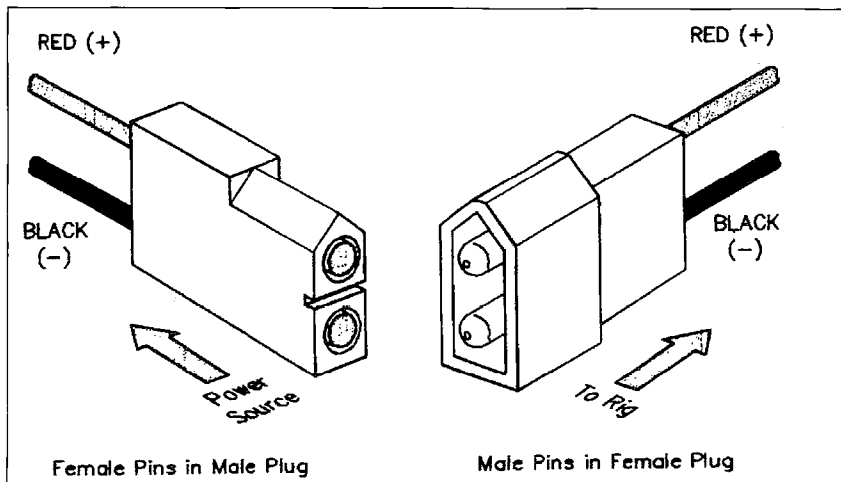


Fig. 1. Molex series 1545 connector for use in promoting compatibility and interchangeability among personal VHF/UHF radio equipment at disaster sites. Polarity should always be verified prior to connecting to radios and power supplies.



operation, things can happen and usually do. A good supply of spare fuses is ALWAYS a must! There are other ways to protect your equipment that make a lot of sense also and can save you the dollars and aggravation a cooked rig causes.

Overvoltage and spike protection is now easy and inexpensive to accomplish with the new semiconductor devices available. The Diodes Incorporated 1.5KE15A is a case in point. It will clamp 1.5 kW, which is 100 amps at its clamp voltage of 15 volts, and is about the size of a pencil eraser. It is inserted across the power input to the transceiver, AFTER the fuse and just before the rig. They are inexpensive and should be on every 12 volt rig you have. You should also have several extras. They will clip momentary spikes like starter transients without any problem, but for a longer-duration problem such as a power supply going over voltage, they will clamp and stay clamped like a dead short. They have to be replaced after such an event. I've had two such events in a short period of time. First, I had a bench supply lose its regulator and go to 26 volts; then, I had a VW alternator go crazy and run the battery to 16 volts. In both cases, the overvoltage protection saved my bacon.

A big bonus with using the 1.5KE15A is that it also provides reverse voltage protection (probably one of the most common occurrences under stress). If the input voltage is reversed, it will promptly blow the fuse (and probably survive in that circumstance). So in this one unit you have both transient and reverse voltage protection.

A good time to incorporate overvoltage and reverse voltage protection is when you are standardizing your connectors. The schematic in Fig. 2 shows the protection incorporated with the Molex connector added. You might want to fuse right off the battery or have two fuses in line — it doesn't really make any difference.

The 1.5KE15A transient diodes are available from Digi-Key [www.digikey.com] at 10 for \$5.54 plus shipping. Unfortunately, there is an additional \$5

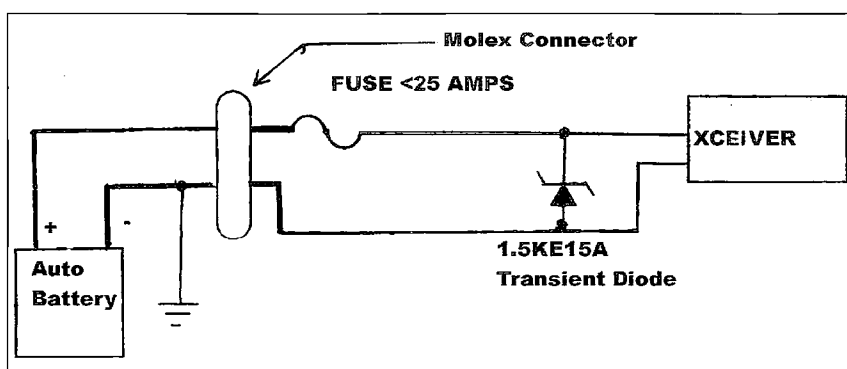


Fig. 2. This schematic shows the protection incorporated with the Molex connector added.

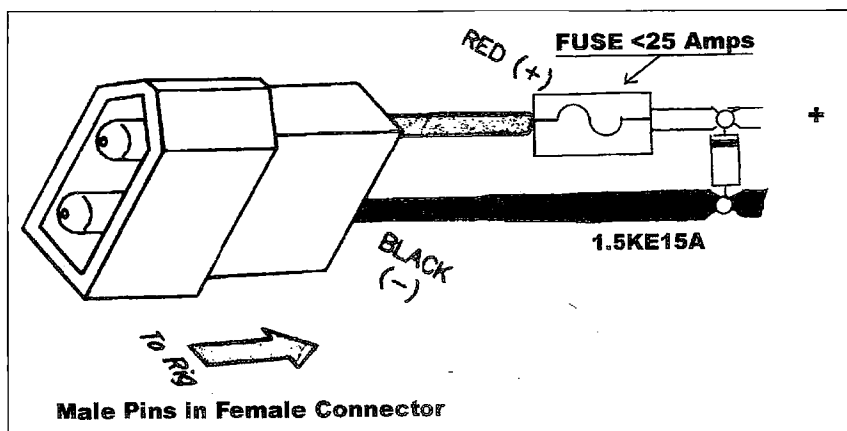


Fig. 3. The wiring pigtail from the transceiver.

handling charge for orders under \$25, so making a group order makes a lot of sense. In the worst case you should be able to get them to your door for a little over a dollar each, which is actually pretty cheap insurance. The diodes can be soldered in or put on a terminal block — whichever is easier. Just remember, you may have to replace these diodes in adverse circumstances, so make them fairly easy to get to and keep some extras with you.

Since most of the newer cars and trucks now use the blade-type fuses, I replaced the AGC-type fuse holders

with the ATC automotive blade-type fuse holders. These holders and fuses are readily available from your local automotive store, or less expensively from All Electronics [www.allelectronics.com]. The blade fuses will take more of a beating than the glass AGC-type fuses will, and are easier to carry.

Fig. 3 shows the actual wiring pigtail from the transceiver. Make sure the banded end of the diode goes to the positive lead after the fuse.

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## Macros: Take Control!

*Digital communications has experienced a virtual explosion in popularity during the past few years. This means it is still quite new to many readers. My intentions are to anticipate your questions and help you over the bumps.*

Many ask, "How do I get started?" If I get this in a direct E-mail request, it is not unusual to have a secondary query: "Can you explain it step-by-step?"

This is an intriguing part of these ham digital modes, getting to where we can "talk" to one another keyboard-to-keyboard. When I get these requests, I usually advise the person to start by downloading DigiPan (free software) from the Internet site listed in The Chart.

Then I continue with some advice to follow such as clicking on the icon of the downloaded file and following the on-screen instructions to install the program. That usually gets the new digital user pretty enthused when he/she gets that far. I go on to explain to open the Help file in the program, which contains every bit of advice needed to get a successfully operating digital station on the air.

If the ham has a computer and an HF rig, about the only other necessary addition will be an interface. DigiPan comes to the rescue very nicely with suggestions. There are complete instructions for making audio cables and even a push-to-talk (PTT) circuit at very low cost. And this isn't simply a "just-to-get-you-going" setup. I am using nearly the exact cable and PTT setup that I built right from the beginning of my soundcard adventure several years ago. It is extremely workable.

There are optional methods of interface that are easy and sure-fire. They are mentioned in the Help file. A beginning digital ham can choose one of the many commercial interfaces on the market. Every ham I have conversed with who is using one of the store-bought interfaces is tickled as can be with it. The downside is cost, \$40 to \$130. The upside is they are in the plug-and-play category. No soldering of tiny DIN

connectors, plus no tricky adjustments in the Windows audio mixer panel. Just plug everything together, follow the instructions, and you are on the air!

I still recall the thrill of observing the first PSK31 signal decoded by my G3PLX software as it printed intelligible text across the monitor. Then there followed the nervous first PSK contacts which included typing in information such as callsigns and BTU exchanges that seemed such a struggle.

### Topic of the day

Of course, the answer was simple. Stop, pay attention, and set up the macros. And that is what I will concentrate on today. No one ever asks much about these things. Many programs, such as DigiPan, come loaded with macros all set up to do the basic interchanges of information. Others leave it entirely up to the new user of the package to set up their own macros from scratch.

Some of the programs come with macros set up by the author that, if used by the new user as-is, will send out the program author's station information. I think the advantage of the latter category is an aid to see just how macros are written in the particular program's format that affords "live" hints for ease of modification by following their pattern.

One of the confusing parts of using different programs for digital communications is that the layout of the macros often does not allow for uniformity when setting up new macros. That is, you will be used to using a certain function key to give your Name and QTH, and when you strike the same key in another program you are sending the BTU macro. And this happens more often than a casual observer would like to admit.

Here is a little blow-by-blow of how this recently struck me. I was reading some comments on the MixW reflector about rig control. In case you are unaware, a number of the programs, including HamScope, Commander, and MixW2, provide excellent software control of many popular rigs produced in the last 20 years by way of serial port interfaces.

This has become a real treat and is expected of the quality digital software being developed these days. The only problem I see with this is the knobs and buttons on the front of my rig are gathering dust since I rarely touch them during operation (no kidding).

You can now, with a number of the programs, change frequency and band as well as mode and filter settings conveniently and often more quickly by keyboard and mouse clicks than via the knobs and buttons on the rig. I read of hams who are controlling their rigs entirely from remote locations either within the house or by way of a phone line from one building to another.

For the extent of this article I will stick to having all the controls available from the operating table. It's more fun that way, at least at first. It is fun, to say the least, to be within sight of the rig and see it responding to the commands you are sending to it from the computer.

When I first delved into rig control, I felt I must be satisfied to gain the frequency input from the rig to print automatically in the log. It has come a long way since then, and this has only been a couple of years.

I mentioned earlier about using the serial port to control PTT. I still have that capability, but now it is not a necessity since the software will toggle PTT through the rig control interface. However there are other uses for that PTT circuit that we will touch on another time.



How today's subject came about is that I was observing a discussion of setting filters on the Icom 756PRO from within macros in MixW2. So, I took the time to follow through on what became a very handy set of three macros. There are three definable filter settings on the PRO, and they work very well as we focus on digital reception.

In the recent past, I found the filter was useful when a very strong signal would come up within a few hundred hertz of the signal I was copying. I could simply reach over and adjust the Pass Band Tuning (PBT) to remove that signal from the waterfall. That would include everything from that side of the signal to the edge of the waterfall display on the monitor. So I knew it worked.

Regular users of the soundcard programs are aware that the DSP filter built into the program brings out the benefits of the soundcard and are often adequate to handle many of the average interference problems without using any other filter from the rig. Experienced regular users have also encountered the problem where a particularly strong signal, even 200 Hz or more away, will reduce print seriously. So there are times when turning on a narrow filter can save the QSO.

However, using a filter has to remain an option for when it is really necessary. The disadvantage of the narrow filter is that you lose the feel of the activity across the couple of kHz in the display and you have no idea where to tune for the next contact.

So wouldn't it be nice to simply click a macro to optimize the reception of your contact when necessary? Well, you can do it. I will show you what works with the PRO with the MixW2. You will have to figure it out for other combinations. Most of the rigs with remotely accessible filters can be made to handle this idea to one degree or another.

I configured three macro keys — Control+F1; Control+F2; and Control+F3 — and labeled them as appropriately as I could so that they would make sense, at least to me.

The first or Control+F1 key macro is:

```
<ALIGN:1450>
```

```
<CATCMDHEX: FE FE 5C E0 06 01 03 FD>
```

This macro activates Filter 3 in the PRO, which I have set at 100 Hz, and at the same time centers the tuned signal in the filter's passband. See screenshot.

Incidentally, there are no letter oh's in the above — they are all zeros. Also, the spaces from FE FE 5C to the end of those

command lines are not needed but make entry simpler.

The second or Control+F2 key macro is:

```
<ALIGN: 1450>
```

```
<CATCMDHEX: FE FE 5C E0 06 01 02 FD>
```

This is the same as the first filter macro, except that it activates Filter 2, set at 400 Hz, and is meant for RTTY and MFSK.

The third or Control+F3 key macro is:

```
<CATCMDHEX: FE FE 5C E0 06 01 01 FD>
```

This activates Filter 3, which is set at 3 kHz so I can see the entire waterfall.

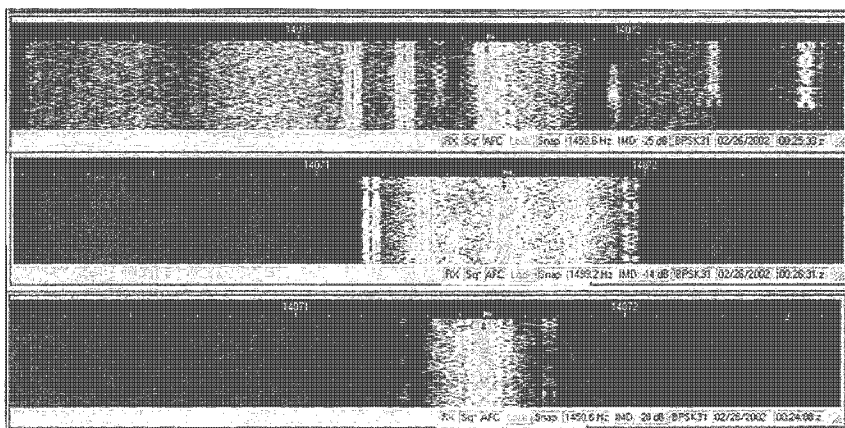
I found there was one default macro key that comes with MixW2 that I never use, and this became a convenient place to install a simple "fix" for a slight problem these two narrow filter designations had caused. It seems the mode settings are picking up the filter settings automatically. So in order to see all the traces in the waterfall, it became necessary to activate the wide 3k filter after changing modes. There is probably an answer for this that I will discover and that will make me able to eliminate this extra keystroke.

For now, the filtering is working just fine. You will find there is almost an endless number of macro key combinations available as you work with this program. There

Source for:	Web address (URL):
Mix W Soundcard program for PSK31, RTTY, new modes, MTTY, FSK31, more	<a href="http://tav.kiev.ua/~nick/my_ham_soft.htm">http://tav.kiev.ua/~nick/my_ham_soft.htm</a> <a href="http://users.nais.com/~jaffejim/mixwpage.htm">http://users.nais.com/~jaffejim/mixwpage.htm</a>
MMTTY RTTY soundcard freeware	<a href="http://www.geocities.com/mmtty_rtty/">http://www.geocities.com/mmtty_rtty/</a>
TrueTTY — Sound card RTTY w/ PSK31	<a href="http://www.dxsoft.com/mtrtty.htm">www.dxsoft.com/mtrtty.htm</a>
Pasokon SSTV programs & hardware	<a href="http://www.ultranet.com/~sstv/lite.html">www.ultranet.com/~sstv/lite.html</a>
PSK31 — Free — and much PSK info	<a href="http://ainte.bi.ehu.es/psk31.html">http://ainte.bi.ehu.es/psk31.html</a>
Interface for digital - rigs to computers	<a href="http://www.westmountainradio.com/RICblaster.htm">www.westmountainradio.com/RICblaster.htm</a>
Soundcard interface info — includes Alinco	<a href="http://www.packetradio.com/psk31.htm">www.packetradio.com/psk31.htm</a>
Interface info for DIY digital hams	<a href="http://www.qsl.net/wm2u/interface.html">www.qsl.net/wm2u/interface.html</a>
WinWarbler info and free download	<a href="http://www.qsl.net/winwarbler/">www.qsl.net/winwarbler/</a>
MFSK — related tech info — how it works	<a href="http://www.qsl.net/z11bpu/">www.qsl.net/z11bpu/</a>
Throb — New — lots of info	<a href="http://www.lsear.freereserve.co.uk/">www.lsear.freereserve.co.uk/</a> <a href="http://www.btinternet.com/~g3vfp/">www.btinternet.com/~g3vfp/</a>
Download Logger, also Zakanaka	<a href="http://www.geocities.com/kc4elo/">www.geocities.com/kc4elo/</a>
PSKGNR — Front end for PSK31	<a href="http://www.al-williams.com/wd5gnr/pskgnr.htm">www.al-williams.com/wd5gnr/pskgnr.htm</a>
Digipan — PSK31 — easy to use — new version 1.6	<a href="http://members.home.com/heller/digipan/">http://members.home.com/heller/digipan/</a>
TAPR — Lots of info	<a href="http://www.tapr.org">www.tapr.org</a>
TNC to radio wiring help	<a href="http://freeweb.pdq.net/medcall/ztx/">http://freeweb.pdq.net/medcall/ztx/</a>
ChromaPIX and ChromaSound DSP software	<a href="http://www.silicompixels.com">www.silicompixels.com</a>
Timewave DSP & AEA (prev.) products	<a href="http://www.timewave.com">www.timewave.com</a>
Auto tuner and other kits	<a href="http://www.ldgelectronics.com">www.ldgelectronics.com</a>
XPWare — TNC software with sample DL	<a href="http://www.goodnet.com/~gjohnson/">www.goodnet.com/~gjohnson/</a>
RCKRty Windows program with free DL	<a href="http://www.rckrty.de/">http://www.rckrty.de/</a>
HF serial modem plans & RTTY & Pactor	<a href="http://home.att.net/~k7szl/">http://home.att.net/~k7szl/</a>
SV2AGW free Win95 programs	<a href="http://www.raag.org/index1.htm">www.raag.org/index1.htm</a>
Source for BayPac BP-2M & APRS	<a href="http://www.tigertronics.com/">www.tigertronics.com/</a>
Int'l Visual Communication Assn. — nonprofit org. dedicated to SSTV	<a href="http://www.mindspring.com/~sstv/">www.mindspring.com/~sstv/</a>
Hellschreiber & MT63 & MFSK16 (Stream)	<a href="http://iz8bly.sysonline.it">http://iz8bly.sysonline.it</a>
HamScope — multimode w/ MFSK16	<a href="http://users.mesatop.com/~ghansen/">http://users.mesatop.com/~ghansen/</a>
YPLog shareware log — rig control — free demo	<a href="http://www.nucleus.com/~field/">www.nucleus.com/~field/</a>

Table 1. The Infamous Chart.





**Fig. 1. Filter/waterfall screenshot** — This is a composite showing the results of narrowing the rig filter on a PSK signal. The upper shot is with the filter “wide open” at 3k. The nearest trace was about 200 Hz away and not giving problems. The middle shot is using the filter set at 400 Hz width. These are not steep skirt filter configurations, so the real width for this exercise is about 700 Hz wherein signals may be copied. I put this filter in for RTTY and MFSK. The bottom shot is with the 100 Hz filter width. This is still wider than 100 Hz but extremely effective. I can get the signal trace centered and then hit the hot key for the filter and the trace is centered with maximum rig filter effect as shown. See text.

are 12 defined macros on the regular screen which can be activated by depressing the corresponding Function key. Plus you have Control+Fkey and Shift+Fkey, which makes a total of 36 individual macros. Well, not just that total, because there is also Control+Shift+Fkey. Now you are at 48, but that still isn't all!

#### How many macros are possible?

If you want a real experience in customizing your macros, change modes — say, to

RTTY — and right-click a macro and rename it and change the macro. (Simply renaming is the eye-opener.) You will find that the label will read whatever you typed in for the RTTY mode only. That is, go to the other modes and come back, and you will only have that label visible in the RTTY mode. The other modes will have the previous label. I didn't attempt any math on this, you can do that on your own. Reality says that there is not a need for a different set of macros entirely for each mode, but

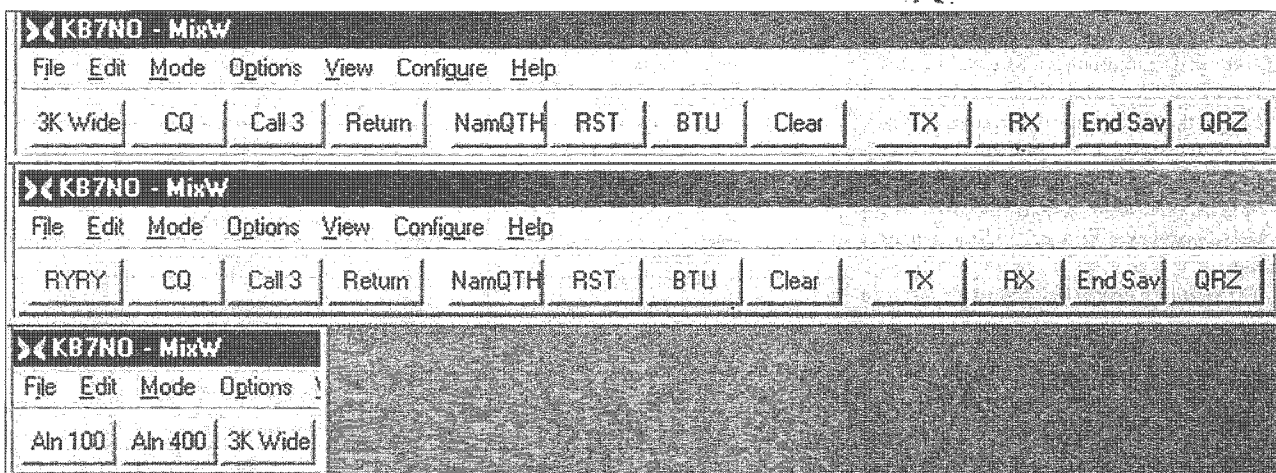
you can see the possibilities. (See screenshot.)

There is another problem that plagues many of us, and that is the loss of the first few characters when someone does a changeover, especially when answering our return to their CQ. This is usually due to slight differences in soundcards and software settings between the two stations.

I have been trying to alleviate that problem as I start my return message to the other station by simply inserting a dozen or so spaces before hitting my Return macro that sends “hiscall de mycall.” A little help here, at least for me, is to insert the spaces in the macro itself. This doesn't solve much on my end, but perhaps it will be something that catches on. In the interim, I have learned to be ready to tweak my tuning on the other station's trace in the waterfall. MixW2 makes this fairly easy by using the Alt plus the appropriate arrow key. In using this combination, I rarely miss more than half my call before the AFC has done its job.

#### Mouse-wheel genius

Speaking of MixW2 tuning helps, something was introduced that I never expected, and that was tuning via the mouse wheel. I got one of these fancy new mice with the new computer six months ago and wondered whoever would need such a device. After I discovered the scrolling advantage on text it started to sink in that it is an okay thing. I had been used to clicking sidebars for so long that I still haven't learned to rely on the wheel to replace that.



**Fig. 2. Macro-key screenshot** — This is a composite of three views of the visible and labeled macro keys in MixW2. The upper row of keys is what I see when working PSK31. The left button (F1) is the necessary filter de-activating macro (see text). Most of the rest are fairly self-evident. You will see that the second row of buttons differs because it is the RTTY set of macros. Only the F1 key differs in labeling. This allows many macros to replicate from mode to mode and you can retain the same labels with changes to the macros per your requirements for that mode. The third row got a little tricky to capture so it is just the first three keys displayed when I hit the Control key. These are the filter select macros (see text) and display this way regardless of mode when hitting the Control key.



But, believe me, using the wheel to quickly move from the PSK portion of the band to the MFSK and/or RTTY area is what some folks refer to as a "trick." How it works in real life is simple. You rotate the wheel one click one way and the rig moves 500 Hz. Move it one click the other way and you are back where you started. That is a real convenience — far and away more useful to me than scrolling this text I am working on with the same wheel. Now I will never return to my favorite old trackball. I wonder if the mouse people paid Nick, the author of MixW2, to put that feature in. You never know what marketing people will come up with nowadays.

### Automate reports

There were several other macros I had been bypassing in the hurry to simply use the software, and I will admit I am not one to build canned QSOs, but one that struck my fancy was the automated RST report. I didn't read how this one worked, but a little experimenting gave it away.

In this program, there is an automated report compiled that is really far more fair and accurate than you and I can guess for a signal report on PSK. If you take a look at the screenshot you will see a compiled report on a signal the rig is tuned to. I keep this little window just below the regular MixW panel for quick reference alongside the CAT bar (which I will get to in a bit).

The macro command to send the signal report in MixW2 is <RSTS>. A little experimenting taught me this is sent from the reading in the log box after I enter it. If you haven't entered it, and the macro is sent, you will see a window pop up that asks for the report and asks if 599 is OK.

I have labeled one of the function keys "RST" and the macro reads,

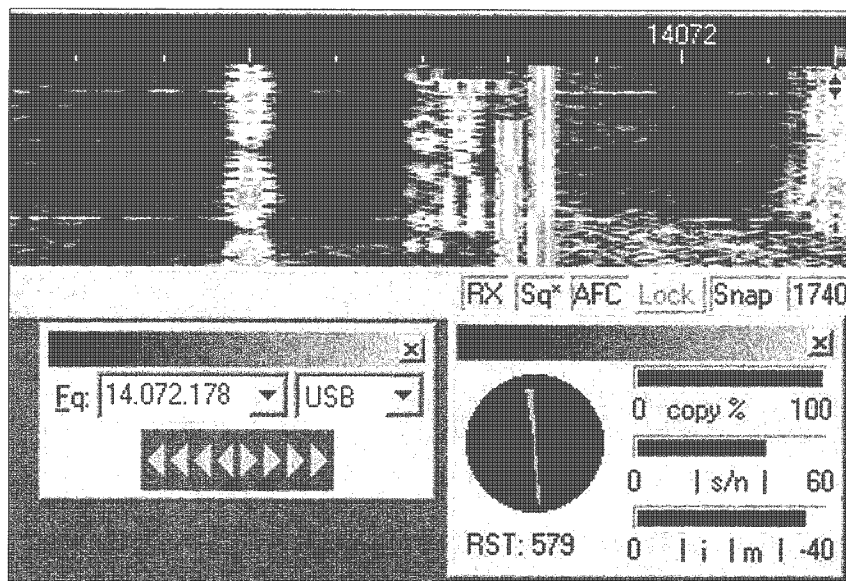
"... Your sig into <MYQTH> is RST <RSTS> and your IMD reading is ..."

This appears in the compose pane as,

"... Your sig into Carson City, NV is RST 599 (or what was inserted) and your IMD reading is ..."

This allows time to insert the IMD reading and if I have forgotten to place the report in the log box I can type in the info direct to the compose pane. My advantage here is that I am usually typing ahead while the other station is transmitting.

I think all communications software supports the type-ahead feature. The advantages are obvious in that you can get a message ready to transmit and the pressure is off — especially the part where the other ham is seemingly looking over your shoulder while you type. I cannot type mistake-free under



**Fig. 3. Tuning indicator and CAT bar** — This is not a composite! If you refer to the full screenshot of MixW2 you will see this is how I have these two pop-up screens positioned just below the regular display. The signal trace being copied is the one at the far right of the visible waterfall. If you look closely at the display that shows RST 579, you will notice the three graph bars indicating copy %, s/n ratio, and intermod. This is the basis for the RST according to the dictates of the author of MixW2. It is all calculated for you; just copy it to the log and you can write a macro to send it (see text). On the left is the CAT bar. The frequency readout is a pull down that allows band changes. Frequency readouts are auto-calculated by the rig readout plus the scale on the waterfall. Rig modes are selectable by the pull-down next to the frequency readout.

any circumstances, but stand over my shoulder and my fingertips turn to something resembling warm putty. I never hit the correct keys.

Of course, there is a disadvantage. Once in a while, we get so caught up in the type-ahead that we forget to watch the receive screen and the other ham has asked a quick question and turned it back with a "BK" and we have blown it. But I still do it. The gaffes are much fewer and farther between and I can explain what I was doing once caught.

To get back to the RST macro, you may wish to leave out any part of this sequence since it does alter the "free life-style" we enjoy in keyboarding. However, it is workable and mimics conversational text once you get the habit in place. The habit is to copy the compiled report from the tuning indicator into the RSTnt field while you are receiving the signal and prior to clicking the macro.

Some of the more common macros most of you have already figured out — such as what I call the Return macro, which I use to head each beginning of transmission — and you probably have a favorite BTU exchange you use. Answering a CQ is a matter of preference, as with all these macros. I make it automatic so that once I have the other

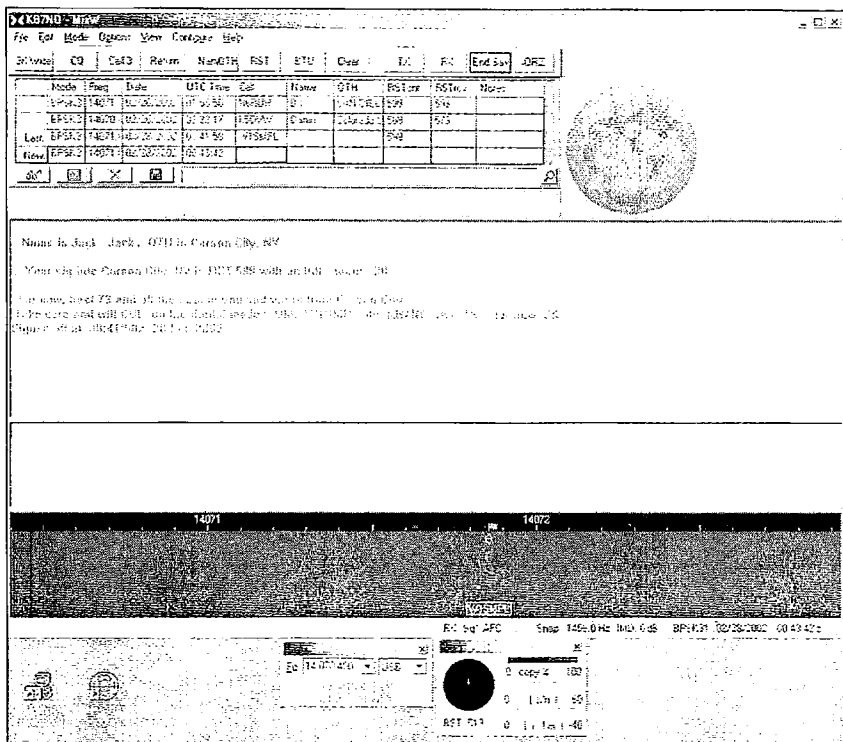
station's callsign in place, I simply hit the macro key and the TX macro toggles the rig to transmit; the other station's callsign is sent twice, after which mine is sent three times and a PSE K, then an automated return to Receive.

Then I watch the waterfall intently to see how close we are on frequency, because if we are off a bit I sometimes miss my call being sent back and do not know for sure whom he is answering. This is where the delayed transmit I was mentioning can be a real advantage. Occasionally the other station will sign on the first go-around with simply a "de W7ABC" and I have to guess he was answering me.

I think there are reasons for some of these inconsistencies. As we bask in the popularity of the newfound digital modes, there are many newbie digital operators who are only into their first few days on the modes. Learning how to build macros wasn't part of the training manual to get on the air. And we are meeting first-timers who have not yet learned how to get the "other station's call" into the little space provided in the program so that macros can work.

Nothing wrong with not knowing the basics. We all have our first-time encounters with communications software. I recall





**Fig. 4. Full view** — To tie it all together, this shot may answer a few questions. Before this off-air shot, I executed three macros which are NameQTH, RST, and End Sav macros. The last macro saved the bogus QSO to the log, which I later removed. Since the rig was not on, the frequency readout at the bottom defaulted to the far-most left of the visible scale above the waterfall. This is what MixW2 looks like. The world map at the upper right is centered on my QTH coordinates and displays the direction to point my antenna when an entered callsign prefix is read by MixW2. The program has provision to direct a computerized rotator.

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numerous sweaty-palm introductions to unfamiliar programs. Most hams demonstrate patience in this area because we have been through it ourselves. The encouragement offered to all who are joining the digital ranks is a marvel to observe. I cannot recall any digital operator dishing out a dressing-down as might be found on some of the other modes because of operator errors.

One last macro I would like to address. Many hams are using a nice "73, SK and save" macro that solves a number of problems. One is that an automated save to the log will very nearly eliminate those "lost" contacts we make. We all have them for various reasons, but if we design a Sign-off macro we will cut that problem to a minimum.

Here is one you can use to do the job:

Good luck and Good DX to you  
<NAME>, 73 for now  
<CALL> de <MYCALL> SK  
Signed off at <TIME> <DATE>  
<SAVEQSO>  
<RXANDCLEAR>

I chose the MixW2 program for this demonstration because it has, as I counted the other day, over 125 macro commands that are added to regularly by the author. The macros are not only intuitive to write but also have an attendant display whenever you bring up the macro edit screen. All ham software has a method of managing and writing macros. Different commands are used. Plus, most have far fewer macros to choose from. The MixW2 is very versatile and has an excellent Help file to answer your questions.

### This is not really a commercial ad

I have to apologize if this month's article sounded like a paid advertisement. I just get a little excited when I see things work this well. The truth is that this is a shareware program that costs \$50, and I paid for mine quite a long time ago before the advent of the version 2. I use the older version in my old slow laptop for portable operation still because it works well and does not require the higher horsepower machine that version 2 does. So the only thing I encourage you to do is get the free download of the full-blown program. It is small and, at this writing will fit on a floppy. Use it for the 15-day trial period and make your own decision.

I have talked to hams who said they were happier with other software, and didn't need all this complexity and wanted to hang on to their bucks. And I have to agree to at least one thing: The complexity does make the learning curve a little steep. You will spend quite a bit of time, even with the excellent Help file getting all the bells and whistles to perform. But it is worth it, especially if you appreciate rig control, antenna rotor control, TNC control, plus built-in logging, along with all the current digital modes and a few features just for the SSB operator.

### Speaking of the learning curve

I have mentioned operating systems the last few months. The Win98 installation is coming together very soon. And the biggie, the Linux platform, has really presented a challenge (definition: steep learning curve).

Fortunately, some ham Linux users have come to the rescue with sources of information that had seemed to formerly be non-existent. Slowly but surely, these things will all come to fruition. There will be a way to slide the skin off these cats.

That's about all there is room for this month. If you have comments or questions about these subjects, I will be glad to help however I can. Drop me a line at [KB7NO@worldnet.att.net]. 73 for now, Jack, KB7NO.



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the August issue, we should receive it by May 31. Provide a clear, concise summary of the essential details about your Calendar Event.*

## MAY 4

**CEDARBURG, WI** The Ozaukee Radio Club will sponsor its 24th Annual Swapfest, 8 a.m.–1 p.m. at the Circle-B Recreation Center, Hwy. 60 and County Hwy. I, Cedarburg. Admission is \$4 in advance and at the door. 8-ft. tables are \$10 each, limited power available on request. Food and refreshments will be available. Sellers can set up at 6:30 a.m. VE exams start at 9 a.m. Talk-in on 146.97/37 PL 127.3. For table reservations and admission tickets, send SASE to *Gene Szudrowitz KB9VJP, ORC Swapfest Chairman, W55 N865 Cedar Ridge Dr., Cedarburg WI 53012-1555*. For info and application, check the Web site at [\[www.qsl.net/orc\]](http://www.qsl.net/orc), or phone 262-377-6792.

## MAY 4, 5

**ABILENE, TX** The Key City ARC will sponsor its 17th annual Hamfest at the Abilene Civic Center from 8 a.m. to 5 p.m. Saturday, and from 9 a.m. to 2 p.m. Sunday. Free parking. VE exams. Wheelchair access. Limited RV parking for a nominal fee. Tables \$7 each. Pre-registration \$7 (must be received by April 29th), \$8 at the door. Talk-in on 146.160/760. For reservations and info, contact *Peg Richard KA4UPA, 1442 Lakeside Dr., Abilene TX 79602*, tel. 915-672-8889. E-mail [\[ka4upa@arrl.net\]](mailto:ka4upa@arrl.net).

## MAY 5

**HAGERSTOWN, MD** The Antietam Radio Assn., Inc., of Hagerstown MD, will hold their 10th annual Greater Hagerstown Area Hamfest, and celebrate 50 years as a Club, on May 5th, from 6 a.m.–3 p.m., at the Washington County Agricultural Education Center grounds located 6.5 miles South on MD Route 65 South of Interstate I-70, Exit 29. The event will be held rain or shine, with lots of covered tailgating areas available. There will be indoor vendor and tailgating tables available, \$10 in advance or \$15 the day of the hamfest. General admission is \$5, with children 12 and under admitted free. VE exams will be held starting at 1 p.m. A limited number of walk-ins will be accepted. Please plan to arrive at 12:30 p.m. for exams. VE contact is *Joe Lockbaum WA3PTV*, E-mail [\[ptvjoe@pa.net\]](mailto:ptvjoe@pa.net). Visit the hamfest Web site at [\[www.w3cwc.org\]](http://www.w3cwc.org). Seminars, demonstrations, foxhunt, vendors. Breakfast and lunch available on grounds. Playground and picnic

areas available. Talk-in on 147.090(+) rpt. For more info or to reserve tables or tickets, contact *Carl Morris WN3DUG, ARA Hamfest Chairman, 717-267-3411*, or fax 717-261-9487. E-mail [\[wn3dug@arrl.net\]](mailto:wn3dug@arrl.net).

## MAY 11

**RENO, NV** The Reno Area Metro Simplex ARC will sponsor the Reno Spring Ham Swap at the KNPB Television Station, 1670 N. Virginia St. (on the campus of the University of Nevada, Reno), from 7 a.m. to 1 p.m. From I-80 take the Virginia St. exit and head north one mile. Free admission to all. Vendors bring your own tables. Large indoor/outdoor swap. Plenty of free parking. Raffle, coffee, doughnuts, tours of the high definition TV station. For VE exam info contact *Don Freeman W7FD*, [\[dfree1@worldnet.att.net\]](mailto:dfree1@worldnet.att.net), tel. 775-851-1176. Talk-in on 147.060(+) (123). Contact *Glen Haggard KK7IH*, tel. 775-673-6401, E-mail [\[kk7ih@nvrms.org\]](mailto:kk7ih@nvrms.org).

## MAY 26

**WEST FRIENDSHIP, MD** The Maryland FM Assn. will hold the MFMA Hamfest at Howard Co. Fairgrounds, 8 a.m.–2:30 p.m. Directions: I-70 to Rte. 32, south to Rte. 144, turn right, go west on Rte. 144, approx. 1 mile to fairgrounds. Talk-in on 146.76, 224.76, and 444.00. Admission \$5. Tables are \$20 in advance or \$25 at the door. Tailgate \$5 per space. Reservations contact is *Mike W3IP, 1294 Dorothy Rd., Crownsville MD 21032*. Phone 410-923-3829.

## JUNE 9

**WHEATON, IL** The Six Meter Club of Chicago, Inc., will present their 45th annual ham radio and electronic flea market Hamfest at the DuPage County Fairgrounds, 2015 Manchester Rd. (North of Roosevelt Rd. (Rte. 38), east of County Farm Rd.). This is an all-weather hamfest with 3 buildings and a large outdoor flea market. Features include ARRL and dealer displays, food and refreshments, free parking — no extra charge for space in the outdoor flea market, limited overnight RV parking with electrical hookup, \$15 each space — advance registration required. Advance tickets \$5, \$6 at the gate. Advance tickets available from *Six Meter Club of Chicago, 2335 South 2nd Ave., North Riverside IL 60546*, or from any club member. Payments for

registrations must be received no later than May 25th. Commercial 8-ft. tables with 110V in the air conditioned main building, \$15 each. Indoor flea market tables, 8-ft. with no electric, \$12 each. For info call the 24-hour InfoLine at 708-442-4961. General parking is at the west gate. Sellers only at the east gate. For handicap parking use the east gate. Gates open at 7 a.m. Buildings open to the public at 8 a.m. Talk-in on K9ONA 146.52, K9ONA/R 146.37/97 (107.2). VE exams 9 a.m.–11 a.m. Call the InfoLine to pre-register for exams. Please note: Absolutely no alcoholic beverages permitted. All sellers are responsible for cleanup of their spaces.

## JUNE 15

**DUNELLEN, NJ** The Raritan Valley Radio Club's "Hamfest '99" will be held at Columbia Park, near the intersection of Routes 529 and 28. Sellers set up at 6 a.m. Buyers admitted 7 a.m.–2 p.m. Admission: Buyers \$5, sellers \$10 with \$5 for each additional space. Talk-in on 146.625 R, 447.250 R tone 141.3, 146.520 simplex. Contact *Doug Benner W2NJJH, 732-469-9009*, E-mail [\[W2NJJH@AOL.COM\]](mailto:W2NJJH@AOL.COM); or *Fred Weimer KB2HZO, 732-968-7789* before 8 p.m.

## JUNE 30

**QUEENS, NY** The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot, Flushing Meadow Corona Park, 47-01 111th St., Queens NY. Vendor setup at 7:30 a.m. Buyers admitted at 9 a.m. Free parking. Food and refreshments. VE exams at 10 a.m. Admission by donation, buyers \$5, Sellers \$10 per space. Talk-in on 444.200 R, PL 136.5, and 146.52 simplex. Web site [\[www.qsl.net/hosarc\]](http://www.qsl.net/hosarc). For further info, call at night only: *Stephen Greenbaum WB2KDG, 718-898-5599*, E-mail [\[WB2KDG@Bigfoot.com\]](mailto:WB2KDG@Bigfoot.com). For info about VE exams, contact *Lenny Menna W2LJM, 718-323-3464*, or E-mail to [\[LMenna6568@aol.com\]](mailto:LMenna6568@aol.com). 73

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# More ARISS

*The ham station on the International Space Station is back in the news. In late February, Expedition 4 Commander Yuri Onufrienko RK3DUO, talked with students at the Kursk Technical University club station RW3WWW south of Moscow.*

This was the 47th ARISS (Amateur Radio on the International Space Station) contact since the station was commissioned in November 2000. The other two members of Expedition 4 are also hams: Carl Walz KC5TIE and Dan Bursch KD5PNU.

### No more "NOCALL"

On packet radio, the transmission of "NOCALL" instead of the operator's callsign is seen as a typical newcomer's error. In the case of ARISS, it was simply the result of the demise of the memory backup battery in the packet TNC (Terminal Node Controller) and the lack of a computer for use with the packet station, which would have allowed one of the ham astronaut/cosmonauts to change the callsign.

Mr. "NOCALL" has been active from space for quite some time. Rather than turn the system off, thus denying earthbound hams the opportunity of making contacts through the digipeat function of the system, the station was left on the air with the ROM-default callsign of "NOCALL." It was strange, but users appreciated it.

One of the activities assigned to the Expedition 4 crew was to swap out the TNC with a new one with a special default ROM that identifies itself as RSØISS. If the battery goes out, the ROM takes over, but "NOCALL" will not be heard again. This same proactive action was provided with the SAREX (Shuttle Amateur Radio Experiment) ten years ago with their TASCOTNC. It held the callsign WA4SIR as the default.

The new ARISS unit is a specially modified PacComm Picopacket TNC that has been mounted inside a white metal box complete with Russian and English labels for all LEDs, connectors, and switches. The AMSAT NA logo and name are prominent on the top side. It was sent to the ISS last year. In addition to one megabyte of memory, the TNC also supports Cyrillic text for any Russian messages. This is accomplished by enabling 8-bit data.

In the early days of the new TNC's operation, the system controllers requested that hams not leave messages for the astronaut/

cosmonauts on the RSØISS-1 Personal Mailbox System (PMS) since there was no computer connected to the unit, and the crew didn't have time to install and use a laptop computer to work with the system. However, within days there were over 80 messages, some of which were likely addressed to the ISS crew. It's sometimes hard to get the word out to everyone.

A nice feature that has been incorporated into this new mailbox is a timer that will disconnect a user if no pertinent packets have been received within a one-minute period. This should help considerably. On past orbiting mailboxes, the lack of a short timeout has kept many potential users off since the TNC would not allow multiple connects while waiting for input from a previously connected station that had dropped out over the horizon.

Ground-based users have noted another feature of the new TNC. It works better. The previous TNC had what some called a "Kenwood filter." If you were running a Kenwood transceiver with built-in TNC like the TH-D7A HT or TMD-700A mobile rig,

This is the ISS PMS HELP FILE. Read it here!, not over the air from ISS	
COMMAND	MEANING
K(ill)	K n [CR] deletes message number n (only to/from your callsign).
KM(ine)	KM[CR] deletes all READ messages addressed to your call sign.
L(list)	L [CR] lists the 10 latest messages.
M(ine)	M [CR] lists the 10 latest messages to/from your callsign.
R(ead)	R n [CR] reads message number n.
S(end)	S (callsign) [CR] begins a message addressed to (callsign).
SB	Sends Bulletin
SP	Sends Personal
ST	Sends Traffic
	Subject: ending with [CR].
	Text: End each line with [CR]. End message by
	typing /ex [CR] or CTRL-Z [CR]
	at the beginning of a new line.
SR(eply)	SR n[CR] Sends a reply to message n prompting only for text.
	typing /ex [CR] or CTRL-Z [CR]
	at the beginning of a new line.
V(ersion)	V [CR] displays the software version of the PMS system.

Fig. 1. The ISS PMS Help file from WB4APR's PCSat Software.



you could easily use the "NOCALL" station in space. For others it was not so easy. The uplink signal had to be virtually perfect, and this is usually not the case with a typical transceiver-TNC lash-up. The ARISS gear seemed to have a rather narrow response. The new mix of radio and TNC is much more fault-tolerant. If you can work local stations with your two-meter packet system, you can work the new ARISS. The downlink for the 1200-baud AFSK signal is 145.800 MHz, with an uplink of 145.990 MHz. Some of the hams who were involved prepping the new TNC for launch on STS-105 included KA3HDO, K3MS, KD3VK, KA3ZYX, W5DID, KD5JSO, WA5NOM, and N8FGV.

### What to do with "NOCALL"

What do you do with an old TNC? If you're on Earth, you can sell it or stuff it in the closet. If you're in space, the best solution is to reassign it. They did. The old TNC included additional circuitry to provide regulated voltage to the two-meter Ericsson transceiver from the ISS 28-volt bus. The old TNC will be used as the power supply/regulator for the new 70-cm transceiver to be installed in the Service Module. Perhaps with a new lithium coin cell battery and a little programming, it would make an excellent UHF digipeater, at least for those of us with suitable Kenwood radios.

### More on ARISS

The article "All Aboard for ARISS... Amateur Radio on the International Space Station" in the November 2001 issue of 73 is still the best all-around source of information about the plans for ham activity on the ISS. The ARISS Web site at [http://ariss.gsfc.nasa.gov] provides further insight into the truly international effort of hams around the world to support this endeavor. Other sites for current news updates include [http://www.amsat.org] and [http://www.arri.org].

### Software for ARISS and PCSAT

Looking back again to the November 2001 issue of 73, another prophetic and significant article was "The PCSat APRS Satellite — More Fun on the Horizon." PCSat (Prototype Communications Satellite) has been a surprising and delightful success after launch from Kodiak Island on October 1, 2001. In February of this year, AMSAT director Bill Tynan W3XO announced that PCSat would now be known as NAV-OS-CAR-44.

Bob Bruninga WB4APR, the driving force behind PCSat (NO-44), has recently updated his satellite command software for the user community. His DOS-based program PCSAT.EXE allows users to monitor NO-44 telemetry in real time, and to send and receive messages. The only difference between this program and the one Bob uses to command the satellite are the actual uplink commands. The program was designed to provide an instant graphic representation of the status of the satellite and to allow keyboard-to-keyboard communications through the satellite's digipeater.

PCSAT.EXE can also be used for digipeat packet operation through other satellites, but with enhancements for ARISS activity. One screen is provided to capture the directory of the ISS PMS system so the user doesn't have to log on to the PMS to see who has messages. Another screen shows a copy of the ISS Help screen — again, so the user need not log on to reference the PMS command codes. The software is free and available on-line at the TAPR (Tucson Amateur Packet Radio Society) FTP (file transfer protocol) Web site. You can get there via the PCSat site: [http://www.ew.usna.edu/pcsat].

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W5DID>LOU,RS0ISS*:
WA5NOM>GIL,RS0ISS*:
WB4APR>APRS,RS0ISS*::BLN5SYSOP:QSL: K5OE@,K9LXH,WA4SAS,KF4VAB
KD5IUG>CQ,RS0ISS*:[EM42XI] Central Mississippi
K4TOM>CQ,RS0ISS*:>73 to ALL
N8DEU-12>APK101,RS0ISS*::ALL :mobile in Huntsville
KF4AAA>CQ,RS0ISS*,EM64UP,SAM:=3439.394N/-08615.303W
W5ACM-2>ANDY, RS0ISS*:
K5OE>CQ,RS0ISS*:W5ACM Hi Andy!
K5OE>CQ,RS0ISS*:Andy W5ACM R U Live?
W5ACM-2>ANDY,RS0ISS*:yes
RS0ISS-1>N6CO:Logged on to RS0ISS's Personal Message System
RS0ISS-1>N6CO:on board the International Space Station
RS0ISS-1>N6CO:CMD(B/H/J/K/KM/L/M/R/S/SB/SP/ST/SRV/?)>
RS0ISS-1>N6CO:International Space Station
RS0ISS>CQ:
RS0ISS>CQ:International Space Station
RS0ISS>CQ:(c) Copyright 1985-2001
RS0ISS>CQ:PacComm Packet Radio Systems, Inc.
RS0ISS>CQ:

```

Table 1. Sample of packets via RS0ISS, early March 2002.



## Power Station 2

*One of the things that you can count on in an emergency is that you won't be able to count on anything. The repeater you plan on using will be down or you won't be able to hit it with the antenna you brought. With the traffic lights out of commission, it will take forever to get to your assigned location. Then, of course, you'll only have limited choices for powering your radio. When an emergency occurs, the first rule is to be as self-sufficient as possible.*

As you know, I'm a firm believer in **BYOP** (bring your own power). Back in the old days (a year ago or so), we used to consider it adequate to bring the handie-talkie and a couple of extra battery packs. Recent experience has demonstrated that in this day and age you need to have a higher-power rig and the battery capacity to run it for an extended period of time.

At home, a set of gel cells for the VHF rig and a deep-cycle lead acid battery for the HF rig fills the bill. With the right kind of regulated charger you can keep these batteries at peak charge so they're ready to go when needed. On the other hand, dragging a battery similar in size to what's under the hood of your car out to the Red Cross emergency shelter site is not going to be a pretty picture. One of the marvels of nature is the phenomenon that causes a battery

to increase in weight depending upon the distance it is carried.

What is needed is all the benefits of the gel cell and charger in a convenient package that is easily transported and self-contained. Fortunately, there are several offerings now available on the market that meet this need and then some. One excellent example is the Power Station product line from The Ham Contact. Recently, I had a chance to play with the Power Station 2, the latest offering for portable power for the ham.

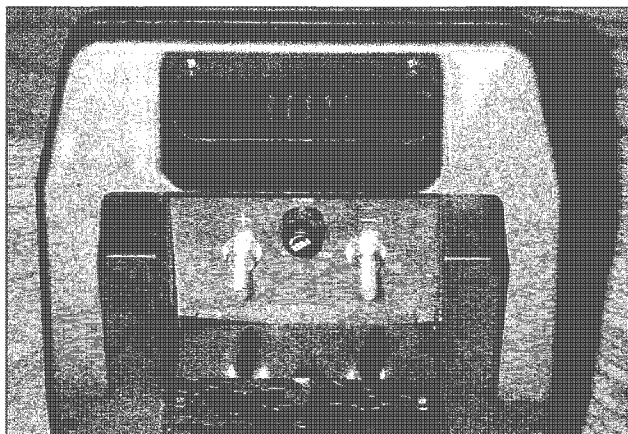
The Power Station 2 is built around a 12 volt, 7 ampere-hour gel cell. This size of battery gives a good balance between available power and requiring an uncomfortably heavy package. The entire package weighs about 7 pounds, so it can easily be included with your "grab and go" kit. Packed in a

durable plastic case, the Power Station 2 has two cigarette lighter outlets on the face and a built-in voltage meter (see **Photo A**). The package is designed with a handle built-in, a small feature that makes such a big difference. Each outlet can be switched separately, which provides some nice flexibility. Although some may want to connect one side to the cell phone and the other to a two-meter rig, I like the prospect of using the handie-talkie on one side and an amplifier on the other. When I can operate at five watts, I leave the amplifier switched off, but when I need more power, I can adjust in a second or two. For larger loads, there are connectors on the back of the unit (see **Photo B**) that can be connected to a mobile rig. This connection can support 20 amps,

*Continued on page 57*



**Photo A.** The Power Station 2 includes a durable case, two cigarette lighter outlets, and a voltage meter. Weighing about seven pounds, it can extend your operating time.



**Photo B.** For higher current requirements, heavy-duty connectors are located on the back. These can be used to connect to a mobile VHF or HF rig.



## Microwave Operation Tricks of the Trade

*Well, tricks of the trade are not all secretive idioms, but rather they're just easy-to-use methods of procedure and equipment adjuncts to make microwave operation easier. For instance, when standing on a hilltop and trying to point your dish to a station on 10 GHz located some 50 to 100 miles from your location, where exactly do you point?*

Also, how do you confirm that your station is operating on an exact frequency — let's say 10,368.1 MHz? Some preparation is needed before starting out to make hilltop contacts.

Additionally, to make remote contacts

you need a liaison frequency to first set up protocol of operation — like who is going to transmit and who is going to receive. What frequency is being used and such. Normally, most liaison communications are set up using either 2 or 3/4 meters.

Omnidirectional antennas or small beam antennas are normally used to begin setup of the communications dialogue. This is fine for setting up who and where to communicate with, but it does nothing on improving your receiver functions, frequency accuracy, and compass heading accuracy.

Where do you point your microwave dish antenna with certainty? Do you set up with a hand-held compass to align your tripod? Remember, most small microwave dish antennas have a 3-degree or less pointing angle, making pointing a dish antenna require accuracy in both vertical and horizontal angles. Larger dish antennas have smaller pointing angles of 2 degrees or less.

Well, the problem is not so difficult after all — it just requires some accessory equipment remotely located — namely a beacon transmitter to make pointing an easy function. A beacon transmitter remotely positioned in a good local spot provides a nearby signal to allow accurate pointing angles to be initially set up. Even if your location does not have a beacon transmitter, one can be set up on the way up to your hilltop spot by dropping off a portable source at a reasonable location for temporary use. Here in the San Diego area we have a local beacon set up keying CW identification followed by a solid key-down CW note for easy location and adjustment of exact heading direction. This makes a great receiver test and allows the exact positioning of a direct compass heading to be set up easily. If your beacon source is accurate in frequency, it also serves to calibrate your receiver with confidence as to frequency. If no one has confidence in frequency and they can copy the beacon, just move 100 kHz up from the beacon frequency and try this tack to make your contact. Several ways to acquire remote

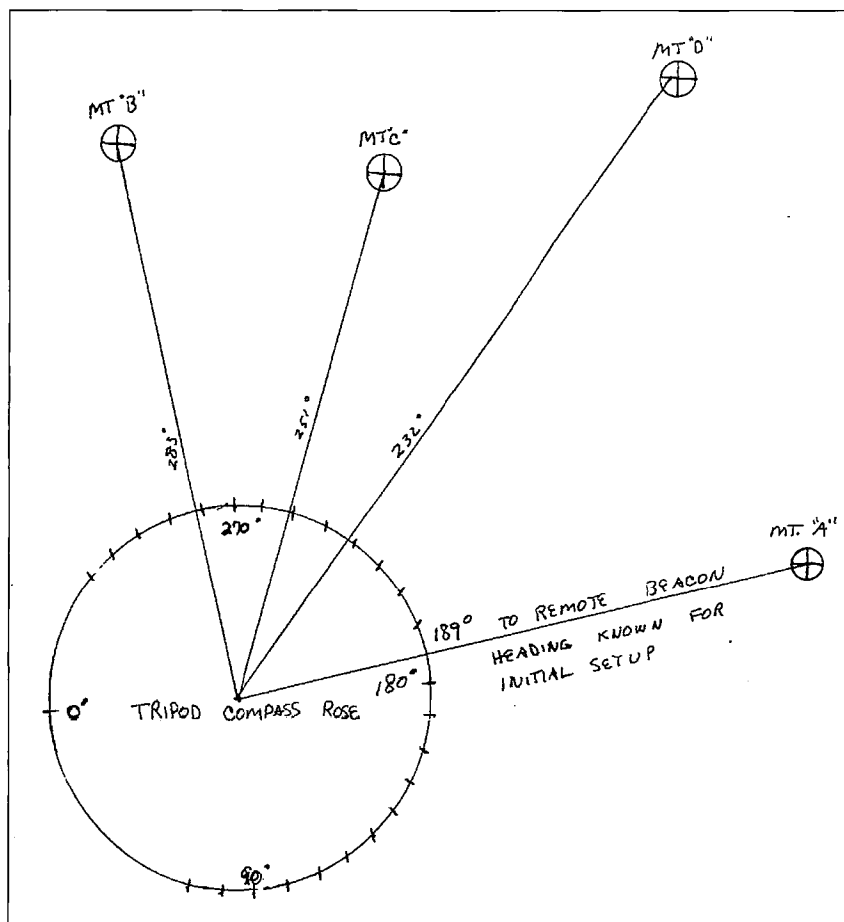


Fig. 1. Compass rose attached to tripod base enabling accurate alignment with a remote beacon, thus calibrating other microwave headings.



stations using microwave and dish antennas are possible.

Once aligned, the microwave dish antenna is properly focused on the remote beacon and the tripod and compass rose positioned to the heading in degrees from where you are to the remote beacon. All other locations are calibrated on the compass rose dial on the tripod mount. As long as the remote beacon's heading is known from your location and the compass rose is so calibrated by receiving a signal from the beacon, you then have one point calibrated. Also, all other points are calibrated by keeping the compass fixed in position and moving the tripod horizontally to the compass heading of the new direction where you wish to make test transmissions.

Knowing where you are set up and where the beacon is located removes the question as to where all other compass bearings (remote distant locations) are. These preparations can be worked out previously and logged on a simple lookup chart. Construction of the compass rose can be as simple as a paper compass on a firm backing, or even two 180-degree protractors forming calibrated 360-degree marks. In any case, whatever you use, mount this compass rose on your tripod below where the horizontal movement of the dish allows rotation of the dish antennas without movement of the compass rose.

Once you've done this simple procedure of calibrating your dish and compass heading to one distant heading, all other location headings are simple to set up. All you have to do is unlock your mount's tripod horizontal base, keeping the compass locked in direction to the beacon, and all other headings are easily aimed at by looking at the compass rose on your mount. All you have to have now is a list of possible locations remote to your location and what compass bearing they are to your location. It's just point and shoot.

Because the beacon is remote to your location — let's say a minimum of 5 miles distant — the vertical orientation will be in good agreement on stations located a hundred miles distant from your location. The difference between 5 miles and 100 miles due to Earth curvature is minimal and will be in good agreement with the beacon setup angles. Even if you want to calibrate this vertical angle it can be simply done by using an old meter movement and removing the spring on the meter vane so that the meter is free to swing like a pendulum. Mount the meter on your tripod upside down and now you have a calibrated vertical incline meter. All you have to do is reference the meter

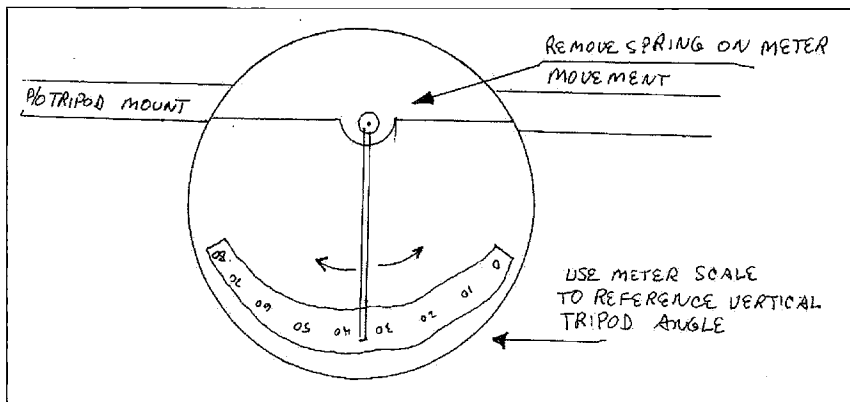


Fig. 2. Meter movement hung upside down (with meter movement spring removed). Becomes incline meter calibrating vertical dish movement.

calibration number from the meter dial (let's say 5.5 mA if it's an old current meter). This calibration is done when you are pointing and calibrated with the remote beacon. Recalibration can be determined at a glance by remembering this original calibration number (5.5 mA), which makes the operation like shooting fish in a barrel.

So much for the simple things. What if you don't have a beacon or frequency standard in your area? What can be done? Well, there are several things that can be done, none of which includes purchasing a beacon from commercial sources, as none exists at any inexpensive or modest price that I am aware of. What we can do is to construct a device home-brew fashion. There are several choices, whether a surplus low frequency brick or a synthesizer that normally operates

on a lower harmonic of the desired microwave output frequency. Finding something calibrated on the exact frequency desired would be a bonus shot if it could be located.

First, let's design a system for a frequency reference with an output of 10.368 GHz with excellent accuracy. Designing this source and constructing one from scratch would be a formidable task. Modifying one from surplus material is a far better success story. Originally, Kerry N6IZW, of the San Diego Microwave Group, constructed the first beacon here with a used Frequency West brick oscillator and a special-cut crystal in a TO-5 transistor-like case. This beacon is a great system and has operated for many years locally, providing a signal for receiver testing and antenna pointing heading alignment. While this device could be copied,

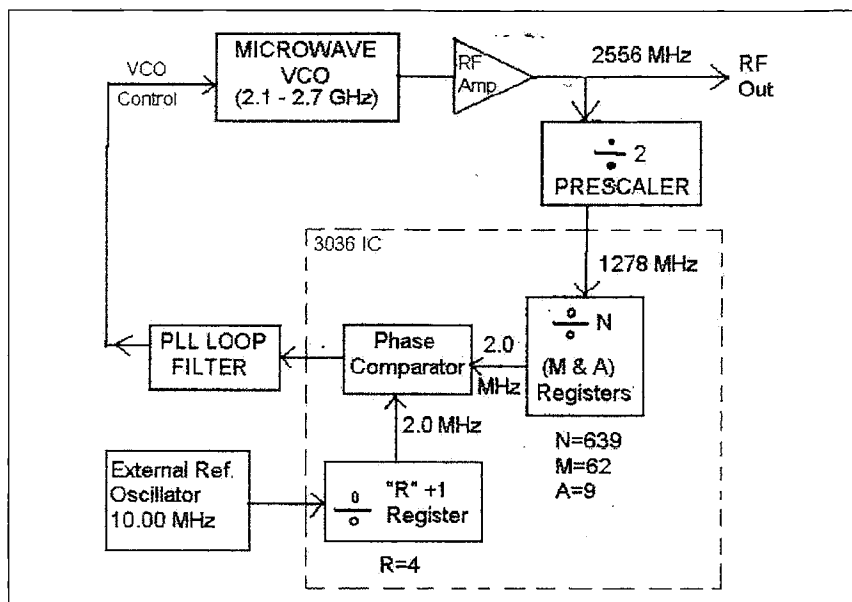
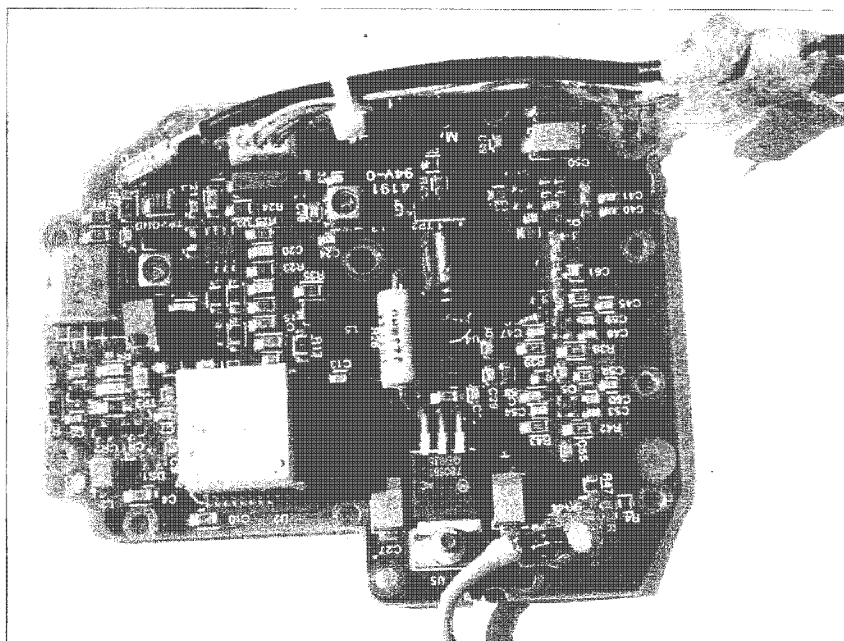


Fig. 3. Block diagram of Qualcomm synthesizer, Texas Version. Example shown for 2556 MHz and 2 MHz reference frequency. All components on PC board except 10 MHz TCXO oscillator.





**Photo A.** The Texas Synthesizer. Main processor PLL chip visible as square white heat sink material. Called Texas board due to shape of unit.

there remain some material acquisition problems that the bricks of years ago present.

The problem with brick-type oscillators is the 100 MHz overtone crystal. It is getting hard to locate suppliers willing to fabricate an oven crystal at reasonable cost. It seems

the crystal required has fallen on low demand and industry wants larger-quantity orders. That makes the alternative plan to use surplus synthesizers more viable. Their attributes include being frequency-agile, small in size, and relatively inexpensive. Agility in frequency comes from the fact

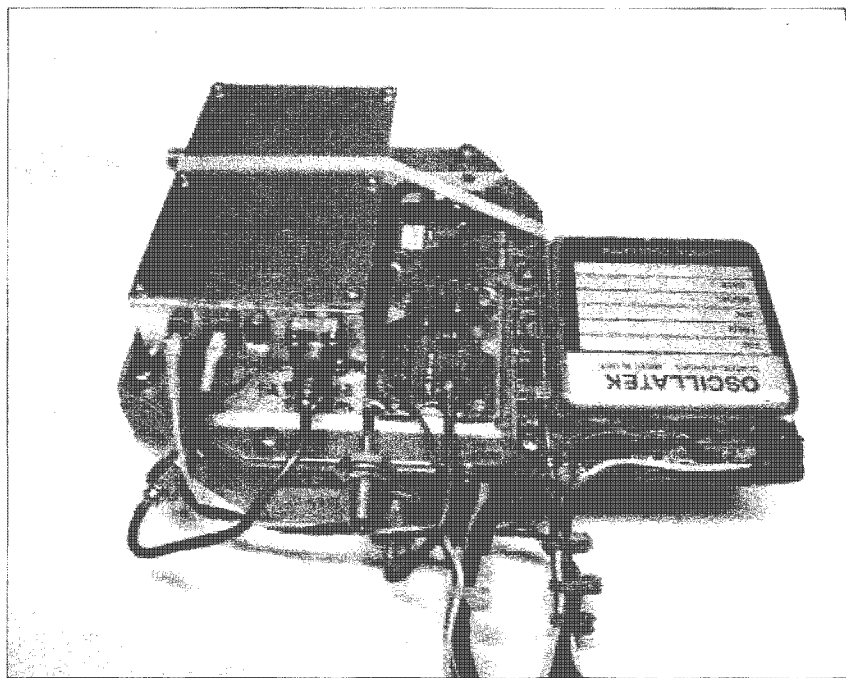
that they are driven by a standard frequency clock which is divided by a reference divider to a submultiple of the desired frequency. See Fig. 3. For a block diagram of a sample unit functioning at 2,556 MHz, which is the frequency for a 10,224 LO and an IF of 144 MHz = operation on 10,368 for a transverter. Another reason for using the synthesizers is that we have a modest quantity of the surplus material and will make the surplus material available.

Let's start out with the modification of a microwave synthesizer source to generate the 10,368 MHz marker signal at a subharmonic of 10,368 MHz. We have synthesizers that normally operate in the 2,300 to 2,800 MHz range in frequency steps of 2 or 5 MHz as determined in programming of the synthesizer reference divide-by counter. Dividing the 10.368 GHz operating frequency by 4 produces 2,592 MHz, which fills the bill nicely as the synthesizers run in the 2.6 GHz range normally. Modifying the original frequency from its 2,620 MHz is quite easy. It requires lifting several pins on the synthesizer chip to reprogram the divide-by counters to another value.

The synth is driven by a 10 MHz TCXO (temperature-controlled crystal oscillator) serving as master clock. For our application, the normal divide-by-2 (i.e., 5 MHz clock rate) is modified to divide by 5 to produce a 2 MHz reference frequency clock for the phase locked loop chip (PLL). This is necessary as the desired frequency in this application, 2,592 MHz, is not divisible by 5 but is divisible by 2.

The VCO (voltage-controlled oscillator) on this PLL board has a VCO oscillator that runs from about 2,300 MHz to just over 2,700 MHz normally without modification to the VCO. A divide-by-two chip interfaces the VCO and the synth chip, as the synth chip has a maximum frequency of 1.6 GHz maximum. The synthesizer we modified we call the Texas board due to its irregular shape — somewhat like the outline of Texas. These synths and clock oscillators are available from the author (see details at end of article).

To convert the Texas synth to its new frequency of operation of 2,592 MHz, lift with a sharp X-Acto knife pin #2 and short solder to pin #3 (Gnd). Lift pin #4 and leave open as it's pulled high (logic 1) by internal pull-up resistors. Lift pins 7, 8, 9, and 14, and leave high (open) logic "1". Lift pins 18, 19, and 21. Short pins 18 and 19 together to pin #20 (Gnd). Leave pin #21 open high (logic 1).



**Photo B.** Completed Texas Synthesizer mounted in heat sink metal compartment with 4x harmonic multiplier on top with another amplifier board for gain at divide-by-2 output. This unit can provide 1/2 LO output or 1,296 MHz, plus 2,592 MHz, multiply by 4 = 10,368 MHz. For band, very accurate band edge markers.

Continued on page 58



## Take the Hamfest Foxhunting Challenge

*If you're an active ham in the heartland of the USA, you're probably packing your bags for the annual trip to our country's biggest ham radio gathering. Maybe you're loading up a motorhome with boat anchors for the big flea market. But even if you carry only a small satchel, to simplify your encounters with airport security, consider bringing along some compact radio direction finding (RDF) gear.*

Hamfests and conventions such as the one in Dayton this month are great for learning about new Amateur Radio activities such as APRS and Internet repeater linking. They are also places where many hams have their first encounter with hidden transmitter hunting, either on foot or mobile. The Foxhunt Forum has been a regular feature at the Dayton Hamvention, and this year's is shaping up nicely.

The festivities are still over two months away as I write, but Dick Arnett WB4SUV (Photo A) and the other Forum organizers are busily making arrangements. "At present we are scheduled to be in Room 4 on Saturday from 9:30 to 10:30 a.m., promoting both mobile and on-foot hunting," Dick E-mailed. "We will demonstrate hand-held 80-meter equipment and any new developments in two-meter equipment that we can uncover. Brian DeYoung KE4HOR will be showing his latest polar plotter on a Palm Pilot. We hope to have Ernie Howard W8EH tell about his external signal strength output modifications to the IC-706. I hope to have one of the new two-meter sniffers that the Australian guys have developed."

### Ready for a ROCA?

WB4SUV reports that there probably won't be an official Hamvention foxhunt this year. Too bad. The one I attended in 1999 brought out hunters from as far away as Sweden for an on-foot romp.<sup>1</sup> Sixteen transmitters were awaiting, and hunters had to find as many as they could in exactly 90 minutes.

Everyone started and ended at the same time. The 90-minute period was just right, because it's long enough to maximize the

foxhunting fun, without being so long as to be beyond some hunters' endurance.

The hunt area, across a highway from the convention site, included the exterior of a school building, a parking lot, and a field with a baseball diamond and large water tower. Foxes could be found in any order. They were concealed inside sidewalk cracks, logs, old tire carcasses, and so forth. A small black-and-gold label with a unique 3-digit number was next to each one, to be written onto the frequency card each hunter carried.

Transmission times ranged from a few seconds each minute to continuous. Since all foxes were on separate frequencies, there was no problem of them QRMing each other.

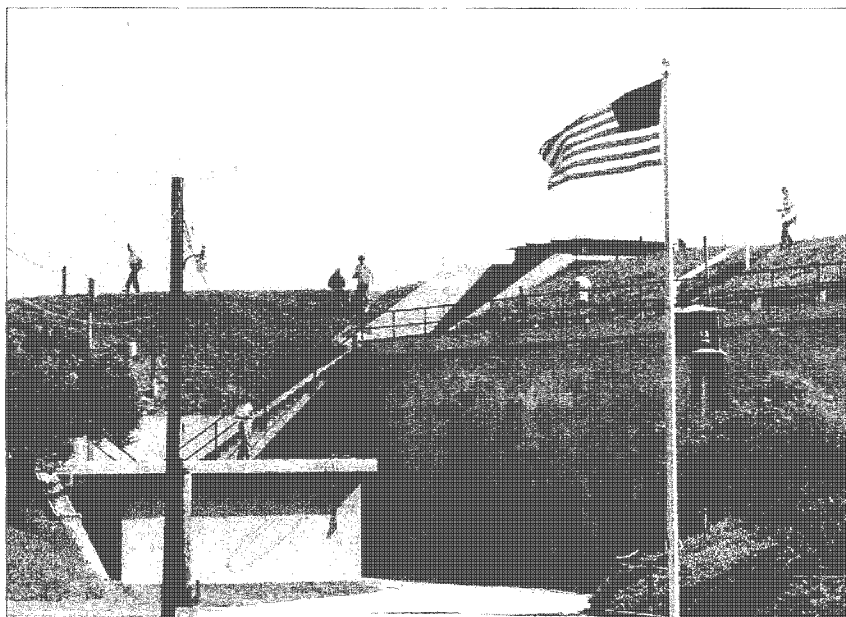
However, hunters had to preprogram 16 frequencies into their HTs and scanners (32 if they used offset attenuation) for best efficiency on the course.

Teaming and collaboration on the course were permitted, but there could be only two hunters on each team at most. A "one RDF



**Photo A.** Dayton Foxhunt Forum organizers Dick Arnett WB4SUV (center) and Jim Elmore KC8FQY (right) present a new transceiver to Paul Gruettner WB9ODQ, who won second place at the 1999 Hamvention on-foot foxhunt. (Photo by Joe Moell KØOV)





**Photo B.** Foxhunters swarm over fortifications at old Fort MacArthur during the 1999 Hamcon foxhunt in southern California. There are two concealed microtransmitters in this view. (Photo by Joe Moell KØOV)

antenna per team" rule was also in effect. This kept team members from hunting independently and then pooling their scores. But it allowed a hunter to have extra eyes to spot the tiny tags.

Winners were determined first by number of foxes found and second by speed. To judge speed and to avoid ties, each hunter was encouraged to have his card checked regularly by course officials, who would

mark down the number of foxes found so far and the exact time. If two or more individuals/teams had the same number of foxes at the end, an earlier check time would place higher in the standings.

These walking hunts are different from standard international-rules hunts (called ARDF or radio-orienteeing) because the area is smaller and there are many more transmitters. Some hams call them ROCAs,

short for "Radio-Orienteeing in a Compact Area." ROCAs are ideal for hamfests and conventions because the emphasis is on RDF skill, not running ability.

Dayton's 1999 hunt was the inspiration for our ARRL Southwestern Division Convention (Hamcon) ROCA near Los Angeles later that year. The Fullerton Radio Club put 21 foxes on the air at Angels Gate Park in San Pedro, California.<sup>2</sup> This 130-acre site, formerly Fort MacArthur, includes everything from well-groomed picnic areas to desolate patches of barren ground, with the refurbished fort headquarters (now a museum) in the center.

Six foxes were on or within 10 kHz of the southern California coordinated T-hunt frequency (146.565 MHz). Hunters didn't know it, but they were all physically close, within about a 900-foot-diameter circle near the start/finish area in front of the fort headquarters (**Photo B**). The QRM should have made them the hardest to identify and track down. Nevertheless, most hunters spent much of the 90-minute hunt period on these six foxes.

The rest of the transmitters were each on separate frequencies throughout the two-meter band. That made RDFing for them easier, but there was plenty of legwork needed to get there. Those foxboxes were widely scattered throughout the park, including the southwest, southeast, and northeast corner areas. Just to make it more interesting, there were some decoy (nontransmitting) devices and tags out there, too.

It was easy to find dastardly hiding locations near the fort. For instance, we put a foxbox out of sight under the back seat of an old jeep that the museum volunteers were driving around the grounds. An ammunition can was already mounted in plain sight between the jeep's front seats (a poor man's glove box), but the T wasn't in there!

Perhaps the sneakiest museum fox was a microtransmitter in the rucksack on one of the young Army "soldiers" entertaining the park visitors. Only three sharp-eyed foxhunters noticed the antenna wire sticking a couple of inches out of his pack.

### The mobile alternative

A convention or hamfest is an ideal time for a challenging mobile transmitter hunt. Most mobile T-hunters are used to having a set of firm rules that bound the hunt area and establish the hidden T's on/off timing. These rules usually prohibit moving or multiple transmitters, except on advanced-level hunts. At conventions and hamfests, however, there need be no hunt rules. Hiders



**Photo C.** Orlando HamCation staffer Dave Flagg N4BGH presents the 2002 foxhunt grand prize to Arthur Byrnes KA4WDK and Patrick Eckenrode AC4QM. Seated in front of them is Bill Thomas KE4HIX of the hiding team. (Photo by John Munsey KB3GK)



have much more latitude. A valuable prize warrants a special challenge. Some hiders say, "If the hunters don't complain, the hunt wasn't hard enough."

John Munsey KB3GK just sent a comprehensive report of the hunt that he and Bill Thomas KE4HIX put on at the 2002 Orlando HamCation on February 9. The prize was an Icom handie-talkie, which drew hunters with a wide range of experience and skill. "This hunt is considered to be the championship hunt for Florida, if not the southeast," John wrote.

The hunters came from as far away as New Jersey, and all except their ride-alongs had lots of T-hunting experience. Two members of the winning team had been hunters for over 20 years. One hunter who didn't win said he had been doing RDF for over 50 years.

"The allotted hunt time for this three-fox hunt was two hours," John continued. "We tested the course in advance and the driving time from the start to the first was 15 minutes in normal traffic. Number two was 15 minutes from the first and number three was 15 minutes from number 2. We expected that all three could be found within an hour. They were almost 'drive-up foxes,' as no hunter would have to walk more than fifty feet after parking the car. So much for our plan.

"The first fox controller was set for one minute on and two minutes off. To get to it, hunters had only to drive east, and when they went under an overpass, make a left turn, go about a quarter-mile, turn into a parking lot, and find a J-pole next to a tree. But the signal was blocked from line-of-sight by the elevated interstate, and as hunters drove closer, it decreased. That caused them to assume that they had passed the site and were seeing a reflection from the interstate.

"Hunters spent lots of time searching the wrong side of the interstate. Then when they figured that out and got closer, there were even more problems. The lot was next to railroad tracks, a chain-link fence, tall buildings, and trees. Reflections were everywhere. After arriving at the site, most hunters took another 30 minutes to sniff out the hidden fox. The hunt started at 5 p.m., and the first team did not leave the first T until an hour later. At that point, Bill and I agreed by cell phone to reduce the hunt to two transmitters.

"The second site was almost due east of the first, with a three-element yagi pointed across a large lake. The signal was good, except when hunters drove into dips or when the signal was blocked by downtown

buildings — where it was lost completely. Only one team got close to number two, and it was after the hunt time had expired.

"When it was all over, KE4HIX and I got together with HamCation Prize Chair Dave Flagg N4BGH. We agreed that since only two teams found #1 and no team found #2 or #3, the transmitters had been too well-hidden and the award should go to the team that found #1 first. Arthur Byrnes KA4WDK and Patrick Eckenrode AC4QM were declared the winners and awarded the HT (Photo C).

"At the after-hunt dinner party, there was plenty of discussion about what went wrong, why they didn't get there, and so forth. Everyone agreed that next year they will do better."

### Unofficial is OK

Even if there's no formal transmitter hunt at Dayton, perhaps there will be some unofficial opportunities to test your RDF abilities. At southern California Hamcons, it's a tradition for attendees to bring their own foxboxes, put them out on the hotel grounds, and have an informal free-for-all hunt as everyone finds each other's transmitters. There are no prizes, just lots of fun and a chance to demonstrate the sport to other hams who ask why everyone is walking around with strange antennas and listening to beeping signals (Photo D).

Will there be transmitter hunts and RDF forums at conventions and hamfests in your state this year? It's up to you to start the ball rolling. An informal spur-of-the-moment RDF "treasure hunt" at your hamfest or picnic can be great fun. It's even better to plan ahead and make a "happening" of your event.

If possible, have it be a sponsored convention activity. This will get you wider publicity, insurance coverage, and maybe enough cash to cover trophies, certificates, prizes, and refreshments. Encourage local "ham celebrities" to attend and participate in your hunt. Personally invite club presidents, repeater owners, ARRL officials, and hams in the local media. Offer to provide RDF gear to them, if you have it, to get them to go out on the course.

There is probably no perfect time period for an ARRL convention foxhunt. For instance, our Hamcons are primarily two-day events, Saturday and Sunday. Having the hunt on Saturday would eliminate the opportunity to have a full-day booth to promote the event. There are too many other competing activities on Saturday anyway, including the usual technical session on RDF. A Saturday night hunt would compete

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**Photo D.** You never know what you'll see at a hamfest foxhunt. Here's Travis Wood KG6AUR testing his doppler hat at Hamcon01 in Riverside, CA. (Photo by Joe Moell KØOV)



**Photo E.** Joe Young VE7BFB is Canada's new ARDF Coordinator. He's shown here at the 1997 Friendship Radiosport Games in Japan. (Photo by Dale Hunt WB6BYU)

with the well-attended banquet. That's why Hamcon foxhunts are traditionally on Sunday afternoon, right after the grand prize drawing. There are always a few no-shows, as people change their plans overnight and some out-of-towners decide to head for home early.

Lots of advance publicity is a must. It increases the likelihood of attracting experienced foxhunters and encourages everyone to make equipment preparations in advance. Put out the word via hamfest flyers, club newsletters, packet bulletins, and Web sites. Follow up with calls to active T-hunters to make sure they attend, and encourage them to spread the word.

If it's an on-foot hunt, remind everyone that all family members who have equipment can join in; a ham license is not required. Make a special effort to contact hams who conduct amateur radio activities with schools, Scouts, and youth groups. I'll mention it in "Homing In" if I get the information at least three months ahead of time.

#### **New ARDF coordinator up north**

Canada has a new leader for international-rules foxhunting. That announcement just came from Joe MacPherson VE1CH, First

Vice President of Radio Amateurs of Canada (RAC), which is that country's counterpart to ARRL.

The RAC Board of Directors has approved the appointment of Gordon D. "Joe" Young VE7BFB as the new RAC national ARDF Coordinator. Young, who lives in Victoria, British Columbia, obtained his first amateur radio license in 1960. An electrical engineer by profession, he has made a 30-year career of developing instrumentation devices.

VE7BFB first became interested in ARDF when the Victoria's chapter of the Friendship Amateur Radio Society (FARS) hosted the Third Friendship Radiosport Games in Victoria in 1993.<sup>3</sup> He has since attended ARDF events in Russia, Japan, and USA (**Photo E**). He organized the foxhunting event when FARS-Victoria again hosted the Friendship Radiosport Games (FRG) in August 2001.

Joe Young replaces Perry Creighton VA7PC, also of Victoria, who in 1997 became the first national ARDF Coordinator to be named in North America. Under VA7PC's guidance, interest in ARDF grew in Canada as hams there put on FRG-2001 and participated in the First IARU Region 2 ARDF Championships in Portland, Oregon, during 1999.

VE7BFB has followed the growing ARDF momentum in the USA and hopes to achieve similar growth on his side of the border. Canadian hams can E-mail him [ve7bfb@rac.ca] to find out more about his plans and upcoming ARDF opportunities. Will Canada send a team to the ARDF World Championships for the first time this year? Maybe so — find out from him.

Similarly, I want to hear from stateside hams with foxhunting stories, photos, and ideas. My E-mail and postal addresses are at the beginning of this article. Also, it may not be too late to join ARDF Team USA for the World Championships in Slovakia, as reported here last month. Check the "Homing In" Web site for the latest team updates and contact me if you want to go.

#### **Notes**

1. Moell, Joe, "Homing In: Dayton Does DF," *73 Magazine*, September 1999.
2. Moell, Joe, "Homing In: Foxhunting at Hamcon99," *73 Magazine*, January 2000.
3. Moell, Joe, "Homing In: Foxhunt Fun at the Friendship Games," *73 Magazine*, October 1993.



## Build This Commercial-Quality Counter: Part 1 of 2

*continued from page 13*

Now, the inputs of the counter. About five feet of RG-174/U mini coax should do the job. A connector was deemed necessary and a little expensive. I found a couple of gold-plated SMA bulkhead types at a ham flea market, so the two of them for \$1 did the job for me. If you cannot find these sub-mini coax connectors, I recommend using BNC or F types from the rear of the enclosure. Maybe two coax runs using grommets from the rear.

Frequency measurement is specified using sine waves. Digital square waves introduce some errors if a strong signal over two volts is to be measured. If a 2V signal is to be measured, use a capacitor (0.01  $\mu$ F) on the probe. Accuracy using a sine wave is  $\pm 1$  Hz up to about 130 MHz. From 130 MHz on up to over 500 MHz, the time base limits the accuracy to about  $\pm 3$  Hz. This is true nine-digit accuracy! Take a look at **Fig. 1** and check out the timing diagram and the explanation of how the accuracy is achieved.

Let's get to the details of the counter. Look at the functional block drawing for a picture of how it works. See **Figs. 2, 3, 4, and 5** for the functional block drawing and schematics.

Next time: construction and assembly. **73**

## Voltage Control for Your Mobile Rig

*continued from page 37*

the center conductor, because it is too thick and not very flexible. As you pull out the center conductor, tie on a piece of #10 and pull it in. Remember, you are only going to use about 7 to 9 feet of shield, and that usually is not a big deal to pull wire into. Notice also that the shielded cable is smaller than the original coax cable.

Route the shielded wire along the fender and away from the ignition system components. Getting the wire through the firewall is a problem. Lots of luck. A few cable clamps and some plastic ties along the way, and you've got it made.

But wait, there's more.

This circuit will also delay turning on your rig by about 2 seconds. The advantage is that you will have the car started and running before the voltage is applied to the rig. It might not be a big concern, but it would be a good idea to delay the turn-on for a few seconds until everything settles down with the electrical system.

The 22k ohm resistor and 1,000  $\mu$ F capacitor give about 2.2 seconds of delay. In case you want to figure a different time, use the following formula for RC time constants:

$$T = R \times C$$

where T = time in seconds; R = resistance in ohms, and C = capacitance in farads.

I built this unit in a small aluminum box and mounted it behind the radio near the passenger side of the firewall. Protect all wires running through holes and around sharp edges with extra layers of tape.

Well, there you have it. Start the car, and 2.2 seconds later your rig springs to life. Turn off the ignition and the radio turns off.

Total cost will be less than \$10. Satisfaction from a job well done: priceless. **73**

## Keying to a Different Drummer

*continued from page 28*

currents in the order of a picoamp, pull-down resistors of a meg are quite adequate. **Fig. 2(left)** shows the key driving CMOS NOR gates in an automatic keyer. **Fig. 2(right)** shows the key controlling an N-channel enhancement-mode MOSFET like Radio Shack's part number 276-2072.

The flat configuration is different and will take some getting used to. It's no deal breaker, though, if you can drum with your fingers. **73**

## ON THE GO

*continued from page 48*

although the longevity of the charge will be less, of course. This will permit the use of a mobile rig with a more reliable

connection than the cigarette lighter adapter plugs.

One of the things that I particularly like about the Power Station 2 is the fact that it comes with both a wall adapter and an automobile adapter for charging. The wall adapter will be the more commonly used of the two, but there are times when the automobile charger will prove extremely valuable. While moving from location to location, just plug in the Power Station to the automobile cigarette lighter of the car to recharge the gel cell. If you've ever exhausted all your batteries during an emergency event, you know the comfort of having some way to recharge. The Power Station can operate your radio for a long time, but never as long as what you'd like to have.

Of course, 7 amp-hours should give you a pretty good base of operations. With gel cells, amp-hours are calculated over a 20-hour period, so a 20 ampere-hour rating means that you should get 1 amp for 20 hours, and not that you can operate a 20 amp load for one hour. (For some interesting facts on gel cells, check out The Ham Contact's Web page.) Based on this, you can expect to have a little over 1/3 of an amp available for 20 hours. The average ham radio consumes much less power when in receive mode, and good amateur practice dictates that during emergency operations we transmit only when necessary and as briefly as possible. Add to this that we always use the minimum power necessary, and you may find that you can operate for days with the Power Station.

Of course, any gel cell-based system needs a certain amount of basic care. The first rule is to not overdo it. Don't overcharge the battery and don't over-discharge the battery. The regulated charging circuit in this unit protects the gel cell from overcharging, but it still isn't a good idea to leave it plugged in indefinitely. Top it off once a month, and you'll always be ready to go. Likewise, when you notice that the voltage is beginning to drop, recharge it at the first practical opportunity. With a little care, you should be able to get a long life from this system.

If you get a portable backup power supply such as this, a few other suggestions are in order. First, you'll need to make sure you have power cables made up for the radios you expect to use. I like to keep an extra cigarette lighter plug with heavy wires and no connector on the other end as a "universal converter" as well as my prepared cable. You can keep all these in one bag in your grab-and-go kit.

*Continued on page 58*



## ON THE GO

*continued from page 57*

Second, transmitter power is always a balance between output and longevity. Even with a good power supply, you will be well advised to optimize your effective radiated power (ERP). A better antenna or a better antenna location can give you the same "punch" as higher power input to the radio. If you can optimize output, your emergency power will last much longer.

If you want more information about the Power Station 2, here's where to look: The Ham Contact, P.O. Box 4025, Westminster CA 92684; order line: 1-800-933-4264; info: 714-901-0573; fax: 714-901-0583; [http://www.hamcontact.com].

With the frequent warnings we've seen on the television and just the current state of affairs, it pays all of us to borrow a lesson from the Boy Scouts and be prepared. Take a few minutes to go through your essential supplies and make sure they're in good order. Hamfests are coming, and you can restock or add what you may need. There are a lot of people who may need us if something else happens, so let's make sure we're ready. 75

## ABOVE & BEYOND

*continued from page 52*

The original synthesizer ran on a 5 MHz loop filter clock frequency that was derived from a 10 MHz TCXO. Because the frequency was divisible by 5, modifications to the loop filter and chip division rate are necessary. Because the desired new frequency, 2,592 MHz, is divisible by 2, we need to convert the normal 5 MHz loop filter to 2 MHz. (See **Photo A**, The Texas Synthesizer.)

Converting to a 2 MHz clock requires retuning the original loop filter to 2 MHz. There are three chip capacitors around inductor L3, the loop filter inductor. To convert the loop filter to 2 MHz rejection requires the placing of additional three chip caps mounted on top of the existing chip cap in the circuit around inductor L3. Mount a 0.001  $\mu$ F chip cap on top of each C25 and C26. Place a 0.0033  $\mu$ F chip cap on top of C26. The filter is now converted from 5 MHz resonance to a maximum rejection at 2 MHz. The additional capacitors in the loop filter reduce spurs about the real frequency at 2,592 MHz. If the loop filter doesn't remove the reference frequency from the loop control, you will be plagued by spurious signals spaced evenly above and below the main signal at 2 MHz intervals. With a

modified loop filter it reduces their effect by some additional 20 to 30 dB rejection to clean up the 2,592 MHz main signal.

The Texas Synth requires a regulated power source of +10 volts at 1/2 amp. The chips used in this synthesizer are power-hungry, so heat sink the main synth chip to keep it reasonably cool. Unless a heat sink used for other than intermittent uses, it will destroy itself by overheating. 2 GHz power output from the board runs about +10 dBm at 2,592 MHz. Operation in an unshielded enclosure should turn a modest 10 GHz transceiver upside down co-located in the same test room. The energy at the 4th harmonic is weak but can be used as a marker at 10,368 MHz. Coupling the synthesizer to a harmonic multiplier board that was part of the original circuitry, the output at 10,368 MHz can be increased to about +7 dBm output power. Gray coax lead = RF output at 2,592 MHz, black coax = 10 MHz reference TCXO input, red lead = +10 volts DC. White and blue leads not used.

Well, then, there it is the conversion of a marker for 10,368 MHz. Test uses. Next time, I hope to cover a multiplier that will provide times-4 multiplication of the 2,592 MHz synth to 10,368 MHz at a modest power level of about +7 dBm.

This does not sound like much power output. However, as an example of power, we operate a beacon running my callsign here in the San Diego area consisting of a brick oscillator +18 dBm that is observed regularly over a hundred miles distant with quite strong signal strength. CW is created and keys DC output to turn on and off the RF output feeding a magnetic waveguide modulator, which feeds a 10 GHz omnidirectional slot antenna. The magnetic modulator attenuates on positive-going high DC pulses and minimum loss on low DC pulses, making the RF at the antenna sound like CW on a SSB receiver. This is just one method we used because it was on hand. Other methods are available and will be explored as this marker beacon project takes form.

I will be looking into pin attenuators, pin diode switches, and whatever can be implemented, using availability and least cost as a target. Waveguide slot antennas for omnidirectional use at 10 GHz are in the construction mill. We are acquiring suitable lengths of WG-16/WR-90 for their construction and looking for a machine shop to fabricate them for us. An alternate to this is to look on the Web site for details on how to construct a slot antenna. Look on the Web at [http://www.ham-radio.com/sbms/] under Technical articles/Programs for data on how to construct them and a whole series

of microwave-related projects. Looking in "Programs" on the Web site, there is a BASIC DOS Run program that will calculate custom-designed slot antennas for 10 GHz.

This synthesizer project is but just one aspect of a microwave tool that can be used for an accurate frequency marker. It can with suitable additional components be implemented into a microwave remote beacon. All it takes is time and some interesting shopping, checking surplus dealers and swap meets to find inexpensive components that can be used in part of this project. Shop your local dealers and swap meets — you might just find useful material in your own back yard. If need be, drop me a note on E-mail and I will try to answer your questions on this and other material you might have located. If you wish to copy what I have constructed so far, I will make available surplus synthesizer and multiplier boards to help bring this part of the marker/beacon project to fruition. Some material is available from me. The synthesizer is \$35 and the multiplier board is \$20. The 10 MHz TCXOs are \$15 each plus postage of \$5 for priority mail, U.S. only, or a package deal for \$70 U.S., postage paid. 73, Chuck WB6IGP. 75

## QRR

*continued from page 7*

devices. These would only be permitted to radiate straight down, with little or no signal leakage in any other direction. The FCC notes that this system could help rescuers find victims in rubble following a disaster or locate ruptured underground pipelines without digging up entire neighborhoods.

The FCC severely limited distribution of ultra-wideband devices that can see through walls and detect motion within certain areas. Only law enforcement and firefighters will be permitted to have them. In other words, you won't soon be buying a home camcorder that can peer through your wall and into your next door neighbor's apartment. And you probably never will.

Right now, the introduction of ultra-wideband will have very little impact on ham radio due to the limited spectrum being allocated to it. But its use could be expanded in the future if it's proved not to interfere with existing military and public service communications.

If ultra-wideband is successful, it could eventually open up a whole new world of communications for ham radio. For starters, think in terms of so-called smart, software-defined radios — a radio that is so smart that you tell it whom you want to talk to and it calls you when that person is ready to hold a QSO.

Thanks to Robert Sudock WB6FDF and the FCC, via Newsline, Bill Pasternak WA6ITF, editor.



## Who is an American?

You probably missed it in the rush of news, but there was actually a report that someone in Pakistan had published in a newspaper an offer of a reward to anyone who killed an American, any American. So I just thought I would write to let them know what an American is, so they would know when they found one.

An American is English, or French, or Italian, Irish, German, Spanish, Polish, Russian, or Greek. An American may also be Mexican, African, Indian, Chinese, Japanese, Australian, Iranian, Asian, or Arab, or Pakistani, or Afghan. An American may also be a Cherokee, Osage, Blackfoot, Navaho, Apache, or one of the many other tribes known as native Americans.

An American is Christian, or he could be Jewish, or Buddhist, or Muslim. In fact, there are more Muslims in America than in Afghanistan. The only difference is that in America they are free to worship as each of them chooses. An American is also free to believe in no religion. For that he will answer only to God, not to the government, or to armed thugs claiming to speak for the government and for God.

An American is from the most prosperous land in the history of the world. The root of that prosperity can be found in the Declaration of Independence, which recognizes the God-given right of each man and woman to the pursuit of happiness.

An American is generous. Americans have helped out just about every other nation in the world in their time of need. When Afghanistan was overrun by the Soviet army 20 years ago, Americans came with arms and supplies to enable the people to win back their country. As of the morning of September 11, Americans had given more than any other nation to the poor in Afghanistan. The best products, the best books, the best music, the best food.

Americans welcome the best, but they also welcome the least. The national symbol of America welcomes your tired and your poor, the wretched refuse of your teeming shores, the homeless, tempest tossed. These in fact are the people who built America. Some of them were working in the Twin Towers in the morning of September 11, earning a better life for their families. [I've been told that the people in the Towers were from at least 30, and maybe many more, other countries, cultures, and first languages, including those that aided and abetted the terrorists.]

So you can try to kill an American if you must. Hitler did. So did General Tojo, and Stalin, and Mao Tse-Tung, and every bloodthirsty tyrant in the history of the world. But, in doing so you would just be killing yourself. Because Americans are not a particular people from a particular place. They are the embodiment of the human spirit of freedom. Everyone who holds to that spirit, everywhere, is an American.

So look around you. You may find more Americans in your land than you thought were there. One day they will rise up and overthrow the old, ignorant, tired tyrants that trouble too many lands. Then those lands, too, will join the community of

free and prosperous nations. And America will welcome them!

*Thanks to those who forward this on the Internet, where it was first placed by a dentist from Australia, we believe.*

## NEVER SAY DIE

*continued from page 8*

Plus, the countries are \$350 billion in debt for loans made to their corrupt governments.

I thought about this while reading a *Time* cover story about Bono (U2) and his interest in helping the African people to improve their countries. He and Bill Gates want to do something about the situation.

The main thing these guys need right now is me.

Unless you've been reading my stuff, that probably sounds egotistic. If you've been reading my essays you know that AIDS, malaria, and other illnesses could be wiped out in a couple of years by getting Africans to rebuild their immune systems with a raw food diet, pure water, and a couple million inexpensive blood purifier units. These units could probably cost under \$10 with mass production, and each one could take care of a dozen or more people. I'm talking about almost zero-cost healthcare.

Then, there's poverty. So, what's the answer to poverty? Education. And in the case of Africa, not just a low-cost education, but a very-low-cost education. Okay, it's time to get Steve Jobs into the loop so his Pixar production company can start turning out DVD-based educational programs which interactively teach reading and writing, and all the other basic stuff that an educated person needs to know.

They'll need a few million DVD players. Battery-operated, rechargeable with small solar arrays, of course, since most of Africa still doesn't have electric power.

Imagine schools where no teachers are needed, there's no memorization for tests, and no grades. Schools where kids (of all ages) learn what they want, when they want, because it's fun to learn. Where they can learn about anything they're interested in.

Okay, we've tackled sickness and poverty, so what about famine? How about a way to grow healthy crops using a tenth as much water as usual? How about growing crops that are five to ten times bigger than we're growing today — and have all of the minerals that are missing from the commercially grown crops we are buying in our supermarkets?

Dictators and oppressive governments? Not when there's an educated public.

Well, not as bad as those in many African countries today, anyway.

The next need is energy. A \$10 million grant to develop a practical home cold fusion generator would provide energy at a tenth the cost of coal or oil. Power is going to be needed to build the transportation and communications infrastructure a country needs to eliminate poverty.

## How You Can Help!

The problem is, how to reach billionaires like Bill Gates, Bono, and Steve Jobs. They're almost totally insulated from mail, E-mail, or visitors. Maybe you know someone who knows one of 'em and can get me an audience. Or someone who knows someone. Gates has to spend, by IRS law, \$1.2 billion a year on good works. Well, what could be better than helping to pull a whole continent out of the huge mess it's in? In quantity they should be able to get DVD players down to \$250 or less. \$250 million would buy a million of 'em. That would be a good start.

Both Jobs and Gates know me well, but even so I haven't been able to penetrate their insulation from the outside world. Have you any ideas or contacts that might help me get through? Maybe skywriting over Redmond or Cupertino?

This isn't going to be easy. I even asked the Art Bell audience to write to Bill Gates and plead with him to call me. Nothing.

## National Geographic

In the Feb. 2002 issue there was a big (twelve pages) article on AIDS. Three million people died of AIDS last year. The pharmaceutical companies are doing their best to develop a cure. Etc.

But, you know, there's not one hint of the nondrug cure discovered (and quietly patented) by the researchers at the prestigious Albert Einstein College of Medicine in New York.

Gee, how could the writer for such a famous magazine miss something that important? A look through the magazine, checking out the double-page ad spreads for drugs, answered my question. M-o-n-e-y. It can buy almost anything, including the silence of the National Geographic Society.

Dreaded killer AIDS, Auto-Immune-Deficiency-Syndrome, is a disease where the name itself suggests a cure. If the immune system is failing, why not rebuild it? How? That's easy — stop doing things that harm it. Make sense?

The pioneers in this field were doctors such as Melvin Page, Weston Price, Lorraine Day, Bruno Comby, and Henry

*Continued on page 61*



## Special DX Forecast

*Overall, ionospheric conditions should improve over last month but will be counterbalanced by negative seasonal influences. At this time of year, atmospheric noise from tropical storms really begins to curtail activity on the upper bands, while decreased MUFs impinge on the lower ones.*

We haven't reached the summer doldrums yet, so you can still find some good opportunities on 30, 20, and 17 meters. Look for decent openings south of the equator and on polar paths to the opposite hemisphere.

Conditions will range from good (G) to poor (P) this month, but I don't foresee any exceptionally good or bad days. The early part of our May calendar has the worst days and so will probably yield more ionospheric disturbances than the latter half of the month. Keep an eye on the 3rd-4th and 12th-13th since they are "critical," showing the highest potential for strong solar eruptions.

The technique that I use to determine these "critical" days is based on the work of John Nelson and was developed while he was employed doing propagation forecasts for RCA in the 1940s. He passed his methods on to my father, who subsequently taught them to me. His system is based on planetary motions and has been refined after years of collecting and analyzing observational data.

Over the years, many detractors have ridiculed this type of "astrology" as lacking a sound theoretical foundation and therefore have labeled it "pseudoscience" — especially after the well-publicized failure of the early-'80s predictions presented in the book *The Jupiter Effect*. However, the statistical accuracy of Nelson's method (over 80%) has continued to baffle scientists and engendered many loyal followers. Those readers interested in the work that is currently being done in this arena should investigate the following three Web sites: [http://www.allanstime.com/index.html], [http://www.tmgnow.com/repository/solar/percyseymour1.html], and [http://www.sunspotcycle.com].

Have fun, and happy DXing!

May 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
			1 F-G	2 F-G	3 F-P	4 P
5 F-P	6 F	7 F	8 F-P	9 F	10 F-G	11 G
12 P	13 P	14 F	15 F-G	16 F-P	17 F	18 F-P
19 F	20 F	21 F-G	22 G	23 F	24 F-G	25 G
26 F-G	27 F	28 F-G	29 G	30 G	31 F-G	

EASTERN UNITED STATES TO:													
GMT	00	02	04	06	08	10	12	14	16	18	20	22	
Central America	15-20	(15) 30	20 (40)	(20-40)	x	(20)	20	(20)	(15)	(15)	15 (20)	(10) 17	
South America	15 (20)	(15) 20	20 (40)	(20-40)	(20)	x	(15)	(15)	x	(10)	(10-20)	(10) 20	
Europe	20	20	(20-40)	(40)	x	(20)	x	x	x	x	(20)	20	
South Africa	x	(40)	x	(20)	x	x	x	x	(15)	(15)	x	x	
Eastern Europe	20	20 (40)	(20)	x	x	x	(20)	x	x	(15)	(15)	(20)	
Middle East	20	20 (40)	(20)	x	x	x	x	x	x	x	(20)	(15)	
India/Pakistan	(15-20)	(20)	x	x	(20)	x	x	x	x	x	x	x	
Far East/Japan	(15)	x	x	x	x	x	(20)	(15-20)	(15)	x	x	(15)	
Southeast Asia	(15-20)	x	x	(20)	x	x	(20)	x	x	(15)	x	x	
Australia	(15)	(15)	x	x	(20-30)	(20-30)	(20)	(20)	x	x	x	x	
Alaska	(15-20)	(15-20)	20	20 (10)	(20-40)	(20)	(20)	x	x	(15)	(15-20)		
Hawaii	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	x	(15)		
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(15) 20	(10) 20	(10-20)	(10-20)	(10-20)	(10) 20	
CENTRAL UNITED STATES TO:													
Central America	(10) 20	(15) 30	20 (40)	(20-40)	(20)	(20)	(20)	(15) 20	(15-20)	(10-20)	(10-15)	(10) 17	
South America	10 (20)	(10) 20	(15) 30	(15) 30	(20-40)	(20)	(20)	(15)	(15)	(10)	(10-15)	(10-20)	
Europe	(15) 20	20	(20-40)	(20-40)	x	(20)	(20)	x	x	x	x	(15-20)	
South Africa	x	x	(40)	(20-40)	(20)	x	x	x	(10-15)	(10-20)	(20)	x	
Eastern Europe	(20)	(20)	(20)	(20)	x	x	(20)	(20)	x	(15)	(15-20)	(15-20)	
Middle East	(15-20)	(20)	(20)	(20)	x	x	x	x	x	x	(20)	(20)	
India/Pakistan	(15-20)	(15-20)	(20)	x	x	x	(20)	x	x	x	x	x	
Far East/Japan	x	(15)	(15)	x	x	(20-40)	(20)	20	(20)	x	x	x	
Southeast Asia	(15)	(15)	(15-20)	(20)	x	x	(20)	(20)	(15-20)	(15)	(15)	x	
Australia	(15)	(15)	(15)	(20)	20 (40)	(20-40)	(20-40)	20	(20)	x	(15)	x	
Alaska	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(15-40)	(10) 30	(10-20)	(10-20)	(10) 20	
Hawaii	(15-20)	15 (20)	(15-20)	20	20	(20)	20	(20)	x	x	x	(15)	
WESTERN UNITED STATES TO:													
Central America	(10) 17	(15) 20	(15) 20	20	(20)	(20)	(20)	(20)	(20)	(10-20)	(10-15)	(15-20)	
South America	10 (20)	(10) 17	15-20	(15) 20	(20)	(20)	(20)	(15)	(15)	(15)	(15)	(15-20)	
Europe	(15-20)	(20)	20	(20)	x	x	x	(20)	(20)	(15)	(15)	(10-20)	
South Africa	x	x	x	(20)	(20)	x	x	(20)	(20)	(15)	x	x	
Eastern Europe	(15-20)	(20)	(20)	(20)	x	x	x	(20)	x	x	x	(15-20)	
Middle East	(20)	(15-20)	(15-20)	(20)	x	x	x	x	x	x	x	(20)	
India/Pakistan	x	x	(15)	x	x	x	x	(20)	x	(15)	x	x	
Far East/Japan	(15)	(15)	(20)	(20)	(20)	(20-40)	(20)	(20)	(15-20)	x	x	(15)	
Southeast Asia	x	x	(15)	(15)	x	(20)	(20)	(20)	(15-20)	(15-20)	(15)	x	
Australia	(10-15)	(10-15)	15	(15-20)	20	20	20	(20)	20	(20)	x	(15)	
Alaska	(10) 40	(10) 40	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(20-40)	(15) 40	(10) 40	(10) 40	(10) 40	
Hawaii	(10-15)	(10-20)	(10-20)	(15-20)	20	20	(20-40)	20 (40)	(20-40)	x	x	(10-15)	
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(15-20)	(10) 20	(10-20)	(10-20)	(10) 20	

**Table 1. Band, time, country chart.** Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



## Band-by-Band Summary

### 10 and 12 Meters

Daytime absorption, causing weak signals, will increase as summer approaches. As always, follow the sun by working toward the east in the morning and the west during the afternoon. Look for a midafternoon peak in the southern hemisphere on 15 meters. Short-skip should range from 1,000 to 2,000 miles.

### 15 and 17 Meters

These bands will also weaken as summer approaches but will still remain workable for the most part. Peak times are as follows: midmorning to the east, just before and after local noon to the south, and from late afternoon through midevening to the west. Long paths across the equator on 17 meters are always a good bet at this time of year. Short-skip will average between 1,000 miles and 2,000 miles.


### 20 Meters

All times of the day should have openings to somewhere in the world on all but the worst days. The strongest signals are usually heard right after sunrise and again just before sunset. A late afternoon peak to the southeast may sometimes be noticed as well. In the evening, try working over the north pole or toward the south and west Pacific. Expect a short-skip of 500 to 2,000 miles during the day and 1,000 to 2,000 miles after dark.

### 30 and 40 Meters

These bands can be very strong between sunset and sunrise, but atmospheric noise from tropical storms will often limit your opportunities, especially on paths across the tropics. However, the best openings should still be found in the southern hemisphere. Some weaker daytime openings also may exist, but expect skip to be very short at 500-700 miles. After dark, expect skip to vary from 750 to 2,000 miles.

### 80 and 160 Meters

High static and weak signals are likely to prevent decent communications on most days. Peaks usually occur near midnight and again in the predawn hours but don't happen regularly. Expect short-skip to vary from 1,000 to 2,000 miles. 

## NEVER SAY DIE

*continued from page 59*

Bieler. Oh, yes, and Bob Beck, who showed us how to turn the Albert Einstein breakthrough from a carefully guarded secret \$100,000 treatment into a \$150 blood-purifying do-it-yourself-at-home deal.

How come we're not seeing a hint of all this in the media? Well, I'm fast-forwarding through Nexium ads in between the car ads on just about every TV show I tape. The pharmaceutical giants are spending billions to promote their drugs. That buys a lot of silence.

### Thanks, Bob!

When I was eight years old, my parents took me along to dinner with their friends Bob and Mary Sullivan. This was in 1930 and Bob had a whole bunch of records and a record player. Bob played the *William Tell Overture* by Rossini, and then some Gilbert and Sullivan. It marked me for life.

I bought my first record when I was 12 — Strauss' *Tales from the Vienna Woods* and *The Blue Danube*. I played it on my folks' old Victrola. It was a dollar, which is about like \$20 today — for ten minutes of music. Yep, I still have that record out in the barn — along with a couple thousand other mostly classical 78s.

Every time we had dinner at Bob's house, I'd sit there and play his Gilbert and Sullivan records.

Then we moved to Washington DC and Bob moved to New York. That ended my music exposure. In those days there were no classical music radio stations.

When we also moved to Brooklyn a couple years later the occasional dinners with Bob and Mary continued, though now they had a couple of small kids. The Gilbert and Sullivan continued, too. It was a three-hour round trip by subway to their place, but I went there now and then to baby-sit for them — and listen to Bob's G&S records.

Soon, I'd learned the "Nightmare" song from *Iolanthe* and songs from *HMS Pinafore* and *The Mikado*.

In high school I joined the Savoyards club and we put on *The Mikado*, with me singing Koko. Later we put on *The Pirates of Penzance*, with me singing the part of Major General Stanley.

This love of classical music got me involved with manufacturing a hi-fi speaker, and, many years later, with publishing a music magazine.

So what's the point of this glimpse into my history? I was just remembering the enormous impact that Bob Sullivan

had on my life. First, with introducing me to classical music, then Gilbert and Sullivan, then he got me my first job in television as chief cameraman at WPIX, Channel 11, in New York City. I graduated from that to TV producer and director jobs in Dallas and Cleveland.

Now, my friend, how many kids, other than your own, have you had an impact on? If you have a passion for something, be sure to share it with youngsters. If you don't have a passion, get a life. Whether it's making ship models, flying model planes, painting, playing an instrument, or ham radio, share it with some kids.

### Water

The Earth is 70% water. The body is 70% water. A cell is 70% water. DNA is 70% water. A coincidence?

Virtually all of us have been short-changing our bodies when it comes to water, and this eventually leads to painful results. One of the reasons for this is that our body lies to us, sending us confusing signals when it needs more water. The signals are there, it's just that we interpret them wrong.

The most common thirst signal is one of feeling hungry. Hey, I need a snack. Maybe a piece of candy or a cookie. Wrongo, big-time — you need a glass of water. Make that pure water please, and not that toxic mix coming out of your faucet.

Another signal that your body needs water is when you feel tired during the day. You don't need a little rest, you need water.

I keep glass bottles of water handy in my office, the kitchen, and in other handy spots around the house and usually down two 48-ounce bottles a day (12 glasses). How much water should you drink? The rule is to drink one half your weight in ounces. At 170 pounds I should drink at least 85 ounces. Which I do.

If you drink coffee or a cola, these are diuretic, so you need to drink two extra glasses of water for every glass of these poisonous drinks. Dr. Batman says that colas are increasing obesity, especially among children. The diet drinks are worse because aspartame breaks down in the body into chemicals which reduce the blood sugar to our brains, making us feel hungry and storing more sugar from our blood in our fat cells.

You can get the straight dope from the leading expert in the water field, Dr. Batmanghelidj (Dr. Batman). His book, *Your Body's Many Cries for Water*, is reviewed on page 17 of my *Wisdom* book.

Ad Sales

call

800-677-8838

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## NEVER SAY DIE

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### Fluorides

The U.S. isn't the first country to fluoridate water. The Germans and Russians added fluorides to the drinking water of concentration camp prisoners to make them more docile and apathetic. It's also added to animals' drinking water to make them more docile.

Fluoridation is illegal in every European country except Ireland. California fruits and vegetables sprayed with fluoride-based pesticides can't be legally imported into any European country.

Are you and your family drinking this stuff? In all probability you are, unless you're distilling it first.

### Time Agrees!

*Time* magazine had a seven-page article on health. Title: "Repairing The Damage." The lead paragraph said, "Ready to turn your life around? It's simple. Eat right. Quit smoking. Get fit. Watch your weight. Drink less. And take it easy. Think it's too late to reverse a lifetime of bad habits? The latest research will surprise you."

Which is exactly what I've been prescribing.

The article says that around 70% of chronic illnesses — diabetes, high blood pressure, and even cancer — can be warded off by a lifestyle change. I think it's more like 95% to 100%.

With over 50 million Americans smoking and over 75 million obese, we have a huge educational need to get these unfortunates to change their lifestyles before they kill themselves. Say, if suicide is illegal, how about slow suicide via smoking and eating too much food?

I was delighted to see *Time* backing me up on this. You can get the gory details of my health program in my *Secret Guide to Health*.

### Military Fuelishness

With the military spending about \$1 per gallon for gas, and then spending an additional \$12 a gallon to deliver it to its vehicles, their fuel bill is up into the double-digit billions. Delivery via refueling planes ups the ante to \$18.50 a gallon. Army tanks get a fifth of a mile per gallon, so a ten mile drive for a tank costs \$650 just for the gas. This low gas mileage substantially reduces their operating range.

But it isn't just the cost of the fuel — 70% of the tonnage shipped before the Persian Gulf war was fuel. The extra time it took to ship all that fuel cost us a month's delay in getting ready.

In view of all these fuel storage and handling problems, one might think that the Joint Chiefs might be interested in pursuing the possibility of developing cold fusion power units that would eliminate all of their fuel problems. One would be totally wrong, of course. The idea of spending maybe five or ten million to bring cold fusion out of the laboratory and into production with the potential of saving tens of billions of dollars has not yet occurred to them.

And this makes sense when you remember that the route to the Joint Chiefs is through the military's promotion system. This is a system which promotes officers by seniority rather than accomplishments. Anyone in the military who has creative ideas or in any other way makes waves soon gets the message that they're never going to be promoted. The system makes sure that the top brass will fight any proposals for change.

Captain Billy Mitchell tried to convince the Navy that aircraft could sink ships — and was court-martialed for his trouble. My father served with Billy when he was stationed at Langley Air Force Base in Virginia, back when I was two years old. I understand that Billy had dinner with us several times, but I don't remember it, or much else from those early days. We had a Model T Ford and I remember the runningboard coming up to my chest.

Inventor Jim Patterson, who has all of the cold fusion patents so far issued, feels that he is just a few million dollars away from developing a reliable power unit ready for mass production. What he doesn't have is the money for this final step. The oil, coal, natural gas, and power companies, with trillions to lose, have managed to bring cold fusion development to a halt. Big surprise, eh?

### Those Annoying Anomalies

When someone like Uri Geller comes along, the skeptics do everything they can to discredit him. Then, when he's tested by a group of scientists and found to be legit, they try to discredit the scientists as inept and sweep the whole thing under their mental carpets. Case closed.

Well-known and thoroughly tested psychics have received the same treatment, as did Edgar Cayce. Well, it goes on like that.

The scientific establishment is just as resistant to new ideas as the medical establishment, the political, and so on.

Both J.B. Rhine fifty years ago at Duke University and the Princeton PEAR labs recently have proven that telepathy, psychokinesis, and precognition are real, yet if you ask any mainstream scientist about this, he'll snicker. Dean Radin, in

his book *The Conscious Universe* (see a review on page 41 of my *Secret Guide to Wisdom*), leaves no doubt that these abilities of some people have been proven real.

The next big step ahead for scientists is to take off their blinders and learn more about these abilities, which those who have them tell us everyone has but isn't using. We need to learn more about how to use dowsing to find things, and remote viewing to see things ... including events in the past and future.

A hundred years ago, Besant and Leadbeater pioneered meditation as a microscope to look at the structure of atoms. Their book, *Occult Chemistry*, is still a marvel to read. Wait'll you read Stephen Phillips' *Extra-Sensory Perception of Quarks*, which tells all about it (page 10, my *Wisdom* book).

How was Nostradamus 500 years ago able to do such an incredible job of predicting future events? Wait'll you read the books by Dolores Canon on her *Conversations With Nostradamus* (page 46, my *Wisdom* book)!

We don't have to spend billions on a Hubble telescope in space when we could train people to use their extrasensory abilities to do an even better job.

Hmm, speaking of telescopes: One of the things astronomers wanted to do was set up a major telescope on the back of the moon. What a fantastic platform! No interfering light from Earth, and no atmosphere to fight. Gee, I wonder why nothing ever came of that? Maybe we didn't want to mess with the aliens and their enormous spaceship that's parked there. Or something.

Writing of anomalies, how about that crop pattern that appeared in a field right next to a British radio telescope last August. The surveillance cameras at the observatory detected no lights during the night in the field. The pattern was a close replica of a broadcast made from the thousand-foot dish at Arecibo, Puerto Rico, in 1974 that included a picture of a man, the double-helix DNA molecule, and the main chemical elements of life. The crop pattern was similar except that the man figure had a much larger head, silicon was added to the life element list, and the DNA was a triple helix.

No, there was no sign of any footprints in the field, and the crops were bent over in the usual interweaved pattern of non-man-made crop patterns. Art Bell had photos of the 1974 Arecibo transmission and the 2001 crop pattern on his Web site. Did it make any of the major media? Of course not.

Continued on page 64



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Bioelectrifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about

the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

**Wayne's Caribbean Adventures:** My super budget travel stories - where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Cold Fusion Journal:** They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

**Julian Schwinger:** A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

**Dowsing:** Yes, dowsing really does work. I explain how and why it works, opening a huge new area for scientific research with profound effects for humanity. \$2 (#84)

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**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. I explain the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts - like Hapgood, Einstein, Snow, Noone, Felix, Stieber. \$5 (#31)

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**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system - the least effective and most expensive in the world. \$5 (#35)

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**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 Editorials:** 120 pages, 100 choice editorials. \$10 (#72)

**1997 Editorials:** 148 fun-packed pages, 216 editorials. \$10 (#74)

**1998 Editorials:** 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)

**1999 Editorials:** 132 pages of ideas, book reviews, health, education, and

anything else I think you ought to know about. \$10 (#76)

**2000 Editorials:** 76 pages (thinner magazine as a result of our slowly dying hobby) \$5 (#77)

**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

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**Colloid Kit.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)

**Wayne's Bell Saver Kit.** The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

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**Cold Fusion Six-Pack:** Six Cold Fusion Journal back issues to bring you up to speed. \$20 (#19)

**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs - such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$35 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon you wondered at their weird gait. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of giveaways that the photos and films had to have been faked. \$46 (#93)

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The 73 Flea Market, Barter 'n' Buy, costs you peanuts (almost) — comes to 35 cents a word for individual (noncommercial!) ads and \$1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

**Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the July 2002 classified ad section is May 10, 2002.**

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## NEVER SAY DIE

*continued from page 62*

### Progress

Life in America for most people wasn't a great deal different in 1901 than it was in 1801. The industrial revolution had just begun, so around 90% were living on farms.

The average life expectancy was 47, with pneumonia and influenza the leading causes of death, followed by tuberculosis and then diarrhea.

There were only 8,000 cars and 144 miles of paved roads. Our larger cities were up to here in horse poop.

Only 14% of homes had a bathtub. The average wage was 22 cents an hour.

Well, we all know what it's like today, but we can't even begin to guess what our country will be like in 2101, any more than anyone in 1901 could have in their wildest imagination have foreseen SSTs, ICs, PCs, the Internet, nukes, faxes, cell phones, cars with global positioning maps built-in, and all the other stuff we take for granted.



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## Build:

- 6m Fun Loop
- RF Xfmrs
- Freq Counter
- Solder Station
- Icom Interface
- Windowsill Mount

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Skogen  
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Glow,  
Little Glo-Bar

How  
Home-brew  
Home Grew





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## QRX . . .

### New Industry Group

The licensed United States amateur radio population is around three-quarters of a million hams. Scanner and shortwave listeners might be double this figure, and the popular GMRS, Family Radio Service, and new multi-use radio service have attracted well

over one million operators. Prominent noncommercial radio user groups like the Personal Radio Steering Group (Ann Arbor, Michigan) and the American Radio Relay League represent the interests of users, but some radio industry officials feel there may be a lot more that the radio industry might do to help spread the word about these sometimes understated

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**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article [IBM (ok) or Mac (preferred) formats], carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

### NEVER SAY DIE

Wayne Green W2NSD/1

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#### The Begging Bowl

A letter from the League asking for donations to help protect our frequencies was interesting in that there was no (zero) mention of using the funds for the promotion of the hobby. It was all about defending our frequencies in Washington and at the 2003 World Radio Conference.

Having been a member of the U.S. delegation at such an ITU conference in Geneva, I've had an opportunity to see at first hand how much the League spends at these conferences. The League General Manager had a lavish suite in the most expensive hotel in Geneva. He had several of the League Directors flown over for parties, and this was after the business of the conference no longer involved amateur radio. He spared no expense.

The ITU hams complained to me that they had to throw him out of meetings because he arrived drunk and had brought along a prostitute.

The best way for us to preserve our frequencies is to use them — and that means we need to replace amateurs who have died or become inactive with new blood. Preferably youngsters.

If you want to sell any product the public has to be aware that it exists. To generate awareness of amateur radio we need visibility — and one gets visibility through promotion. We need articles in the newspapers and in the national magazines. We need to have hams with the ability to sell the hobby on thousands of radio and TV talk shows.

People need repeated exposure to something new before they'll make an effort to follow it up.

We have hams working in radio, TV, movies and other media who could be encouraged to help promote the hobby. We need hams to be written into scripts.

Every time a ham or club does something outstanding our PR guns should be blasting away mercilessly. Getting PR is easy when you know how and bother to take the trouble. I've produced a \$40 video which explains, step by step, how to get PR into magazines and newspapers.

When your director shows up at a club meeting put the screws to him for not pushing the League to mount a PR campaign aimed at getting us more young hams. If he hasn't been showing up at your club ask him why. That's a big part of his job. He's *your* director. He's supposed to represent you and your club.

The next time you get a begging bowl letter from HQ that doesn't mention a major PR effort to keep the hobby from slowly dying send them a penny instead of \$1,000. A penny for their thoughts on not bothering to promote the hobby. We are in desperate need of a hobby lobby.

Now, that World Conference. Has anyone at HQ done *any* homework on this? Which country conference position papers in some way threaten our ham bands? Okay, have we then bothered to send a representative to that country to discuss their position, or are we going to wait until the

conference, by which time it will be too late for them to change their position? As far as I know the League has not one representative doing this international lobbying work.

These are the kinds of things that our only national organization should be doing. It's up to you to get the HQ gang off the Newington golf course and into action so they won't be out of work in a few years.

#### Pole Shift

Scientists have been perplexed by the recent shifting of the Earth's magnetic poles. They're wandering. Substantially. Is it due to the recent weird solar activity? Or what? Yes, of course, I think I have the answer.

If you've read René's *Last Skeptic of Science* (see the Radio Bookshop ad, page 63), you're aware that he proposes that the Earth's magnetic field is caused by the ocean currents, which are slowly circling the Earth. Well, it makes sense, according to the right-hand law: When an electric current moves in the directions of your fingers, of your fist, your thumb will be the north pole of the resulting magnetic field.

So we have a saltwater conductor slowly rotating around the globe and the resulting magnetic field being generated. But why should that field move around?

While listening to Art Bell talk about the melting Antarctic ice field, which is all fresh water, he mentioned that this was disturbing the saltwater

currents. Zap! There's the answer. Adding billions of tons of fresh water to the ocean is obviously going to perturb the current flow, and thus the magnetic field it generates.

I'll bet someone with a good computer could predict the pole movements just from estimating the quantity of ice being melted where.

Oh, in case you fell for the 'Earth as a magnet with an iron core baloney, be advised that the core is molten and iron cannot be magnetized above a certain temperature.

#### The Crop Enigma

Though you don't read about 'em in *Time*, or see anything about 'em on the evening news, those pesky crop patterns have been around and unexplainable for over 30 years. They've been appearing almost every day over that time, in crops, in snow, on ice, and in sand.

No, they're not being made by two old British farmers. They've appeared in over 50 countries, though the crop patterns are the most prevalent in the English fields.

If you check out sites such as [cropcircleconnector.com] you can see some of the fantastic patterns that have been laid down, all within a few minutes, and none showing any sign of footprints around them, and in a way that no one has been able to duplicate.

The most amazing one, which I've mentioned before, was a close reproduction of a transmission years ago from

*Continued on page 7*



*continued from page 1*

capabilities of each radio service in an emergency, and for radio safety out on the highways or trails.

"I don't see any amateur radio promotions in RV magazines, nor in aviation and marine magazines, nor in law enforcement journals," comments William Alber WA6CAX, a ham radio instructor and reserve airborne public safety officer.

"Our city's Citizens Emergency Response Team (CERT) program encourages a close relationship with licensed amateur operators, plus our CERT members are trained on how to use FRS equipment, scanners, and GMRS radios," adds Ms. Teri Durnall, City of Costa Mesa, CA.

Bob Leef, Public Relations Chairman for REACT International, reminded me that the REACT organization was developed in the 1950s by a radio industry CB equipment manufacturer, Hallicrafters.

On April 5th, during an informal amateur radio industry meeting held in Milwaukee, Wisconsin, hosted by ham radio megadealer Amateur Electronics Supply, a lengthy discussion ensued on how to attract more radio hobbyists to the amateur service. Most all industry members agreed that small ads in selected magazines for RVers, flyers, mariners, and camping enthusiasts would surely bring in leads. An ongoing discussion with the Amateur Radio Relay League confirms no ad trade-out program in place, nor any marketing plan on how to follow up on a lead to their 800 number when someone wants to become a ham radio operator.

The American Association of Radio Enthusiasts (AARE) was thus formed as a nonprofit corporation for the promotion of amateur radio and all emergency communications into different markets, and to provide a conduit for dealers and ALL hobby radio manufacturers to exchange ideas, work together on projects, and help the radio services grow. The amateur radio service might be double the number of hams in the next 5 years with an aggressive marketing program covering a wide range of age brackets, and even a wider range of other recreational hobbies.

"The amateur license will be much easier to obtain next year when the entry-level Technician class test is completely rewritten," adds Julian Frost N3JF, a ham radio instructor who works closely with kids.

"Out go the technical questions about the inner workings of a radio, and in will come test questions written by active ham radio operators to better reflect those subjects that hams need to know to become a good entry-level operator," adds Frost, referring to an announcement by the Amateur Radio Question Pool Committee that the Technician class for July 1, 2003 (next July), will undergo a major rewrite.

The ham industry will also explore the best way to handle incoming inquiries on how to become a ham.

"Right now the leads may come into an 800 number, and the recipient simply gets a single letter with a computer listing of ham clubs, test sites, and a list of ham instructors within a relatively large geographic area. There appears to be no follow-up nor any local ham ambassador to work these leads, and this may be an area where industry might help," adds William Alber, a noted ham instructor.

Members of AARE were chosen to lead the debut year. They represent many facets of the ham radio equipment and accessory market: Ray Novak KC7JPA, ICOM America, president; Rick Ruhl W4PC, of Creative Services Software, vice president; Evelyn Garrison WS7A, representing Alinco, as secretary/treasurer; yours truly (Gordon West WB6NOA), Gordon West Radio School, advisory board of directors; Bob Heil K9EID, Heil Sound, board of directors; Randy Gawtry KØCBH, Timewave Technology, member-at-large.

The AARE Web site is at [<http://www.aaregroup.org>].

The group will be "the voice" of the manufacturers and dealers in radio, much like the American Radio Relay League is the voice of each ham radio operator.

"We look forward to encompassing all aspects of the amateur radio industry retail dealers, manufacturers, and distributors. This organization will provide an important focal point leading to the growth of the amateur service," said Novak.

It was pointed out in the industry meeting that only a small percentage of entry-level test preparation book buyers ultimately become licensed as a Technician class operator. Next year's complete rewrite of the Technician test question pool may substantially increase the number preparing for the test to ultimately become licensed hams.

The industry will also embrace other radio service industry members to join them to better educate the public and citizens emergency response team volunteers on the importance of ham license and no-license radio equipment, and how to use that equipment in case of a national or local emergency. With the National Weather Service soon to develop a new electronic voice over its 24-hour weather stations, there needs to be more public awareness on all of the safety benefits of a weather receiver in addition to more information about weather alert as well as geographical S.A.M.E. specific area announcements.

Both the industry as well as ALL RADIO USERS are encouraged to look at the AARE Web site to add input to this newly formed group, or to find out how to join this group as part of the radio industry.

Hobby radio enthusiasts may now find it easier than ever to learn about what's new in the Amateur Radio Service. The new industry group, American Association of Radio Enthusiasts, collectively brings over 100 years of ham radio expertise in support of the hobby, as well as support for ham radio use in emergencies.

"Our industry looks forward to encompassing all aspects of the radio industry," comments Ray Novak KC7JPA, president of the American Association of Radio Enthusiasts.

One of the first goals of the amateur radio industry is to develop a stronger and more thorough marketing program directed to ALL radio enthusiasts thinking about joining the ham radio hobby and service.

The industry will develop close ties with popular hobby groups that may wish to add ham radio as an adjunct to their unique pastimes: recreational vehicle travelers; long-range sailors and boaters; scanner and shortwave listeners; missionaries and remote world travelers; Scouts and wilderness hikers; public safety personnel; citizens emergency response teams; and private pilots.

"We have so much good news to tell all these different user groups," comments Evelyn Garrison WS7A, representing Alinco and serving as the industry secretary/treasurer.

"Amateur radio operators are completely rewriting the entry-level Technician class no-code test. Not only is there no knowledge of Morse Code required to earn the Technician license, but the examination next year will focus on radio OPERATING, as opposed to the present test focused on the more technical aspect of ham radio equipment," adds Garrison, well known for her 50 years in ham radio marketing and the big believer of ham recruitment beyond the ads in the industry's own ham magazines.

"Now that the ham radio service was completely restructured in April of 2000, we think anyone involved in hobby radio will want to earn the entry-level Technician test and learn about all that's new with the ham radio service," echoes Rick Ruhl W4PC, of Creative Services Software, serving as AARE vice president. Kids and computers may be his first priority!

The amateur industry group AARE wants to offer all radio enthusiasts an opportunity to let the group know that there is indeed ham radio interest in these other hobby areas. A single toll-free phone call will allow nonhams to receive a free introduction-to-ham-radio package and be counted as a specific interest group thinking of adding ham radio to their hobby. Simply phone 1-800-326-3942, or send E-mail to [[wb6noa@arrl.net](mailto:wb6noa@arrl.net)], and state your principle hobby interest — boating, flying, no-license radio service, etc. This will help the American Association of Radio Enthusiasts focus future promotions. The industry also welcomes any comments on how other radio enthusiasts view the Amateur Radio Service in general.

Again, the AARE Web site is [<http://www.aaregroup.org>]; radio dealers and manufacturers of radio products may join the organization by contacting Evelyn Garrison at [[www.evelyn@aaregroup.org](mailto:www.evelyn@aaregroup.org)].

*Thanks to Gordon West WB6NOA.*



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## NEVER SAY DIE

continued from page 4

the Arecibo observatory which depicted man and DNA. Only the crop pattern had an alien head and a three-spiraled DNA instead of two.

This beaut was laid down in a field close to a British observatory.

I've always been a big fan of anomalies ... things that science hasn't been able to explain. I loved the books by Frank Edwards and Charles Fort. I'm curious.

Every now and then Art Bell W6OBB has an expert who has studied some weird phenomenon. He has enough of them so I tape the show every night and listen to it while I'm fixing and eating breakfast. He has his guests on during the second hour ... that's about 11:12-11:29 p.m. Pacific time, after the news and commercials. And then again from 11:42 to 11:59. This goes on for a couple hours more. The program is on over 500 stations most nights, so you can pick out the station for the best reception. I do best up here in New Hampshire with WPTH in Philadelphia.

Most guests are able to cover their subject pretty well during the first hour of the show, so often it takes only a half hour of your listening time to come up to speed on remote viewing, artifacts like a 200-million-year-old lump of coal with a gold chain embedded, conversations with the dead, and other fascinating subjects.

## The Grim Future

There was an article in the May *Scientific American* about the demise of electronic and computer hobbies. The illustration purported to be of a hamfest. It had one lonely guy by a table of equipment, none of it ham stuff, that I could see.

My first reaction was to check my photo file for the pictures I took from the air of the Dayton HamVention, back when I was welcome there. But then I remembered my pictures of a recent New Hampshire hamfest where the exhibits looked a lot like the one in the article.

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Continued on page 48



# LETTERS

## From the Ham Shack

**Bill Pasternak WA6ITF.** I wonder if you will be immodest enough to let me share with your readers some thoughts I have, from the perspective of having been involved in ham radio a long, long time.

It seems to me that once again, *73 Magazine* has cheated the “grim reaper of magazine hell” by pulling off a fourth — or is this its fifth? — resurrection. This is not the first such miracle pulled off by its founder, and most believe it will not be the last. Here is the latest installment of the ongoing saga.

A few years ago, most industry sources were betting that *73* would not be around much longer. Major advertisers had pulled out in protest over Wayne Green W2NSD's nonham radio editorials. While the ham business community will never admit it publicly, word is that they wanted Green to get back to his long-running and highly inflammatory tirades against the ARRL and other long-established amateur radio traditions. A year earlier Green had essentially abandoned writing about ham radio; concentrating instead on off-beat science like cold fusion, homeopathic medicine, problems in the nation's educational system, and other esoteric nonham topics. Green made it clear that he had no intention to go back.

For its part, industry looked at Green and *73* as being one and inseparable. To them, advertising in *73* was “buying” Green's glib tongue and anti-ARRL rhetoric. They felt that without his ongoing “League bashing,” the magazine would lose its reader base. With advertising money tight for most Pacific-rim companies due to the problems with Japan's economy, something had to go. What went was almost all advertising in *73* by the Japan-based ham radio manufacturers. Those are the baseline ads that comprise almost 80% of all revenues received by all ham radio magazines.

Most believed that it would be only a few months before Green and *73* folded the tent, but they did not reckon with the resourcefulness of Dr. Wayne Sanger Green. Nor did anyone think that Green would again pull the proverbial “rabbit out of his hat” and find a way to save his beloved *73 Magazine*.

Green did find a “magic rabbit.” This time it would be in the form of worldwide popularity outside of ham radio that he would gain by appearing as a guest on an overnight talk radio program hosted by another ham. That program is “Coast to Coast AM” with Art Bell.

Bell, who is W6OBB, is the hottest property in the history of overnight talk-radio. He originates his show from a studio in a spare room of his Pahump, Nevada, home. From there, it's uplinked by a Ku satellite dish in his front yard for the world to hear on their radio receivers and on the Internet using Real Audio streaming. With close to 500 stations broadcasting his show and the backing of the mighty Premiere Radio Network, Art Bell became a household name and Green has literally ridden on his coattails.

Having heard Green's first appearance and most thereafter, it was a match made in heaven. Green has always been very adept at “selling Green.” His vast knowledge of such topics as cold fusion, homeopathic medicine, colloidal medicine, and his view of the problems in education make him fit the “Coast to Coast AM” format well.

Dr. Green and host Bell also share something else in common. Both hold high disdain for the American Radio Relay League. They are open in their belief that the ARRL mistake of fostering “Incentive Licensing” has led to the erosion in the hobby we see today. Neither supports the ARRL, and both are outspoken on their alternative views on how to resurrect interest by youngsters in radio and communications technology.

And so it was that W2OBB invited W2NSD to spend five hours with him on “Coast to Coast AM.” The next day, the various Internet ham radio newsgroups and other remailers were buzzing with discussions of what Green had said about the ARRL. The controversy he had evoked has yet to die and as a result, hams who had never before heard of Green or *73* were writing checks to subscribe. If he were reading the newsgroups, Green would have known that his latest resurrection had begun.

Green's subsequent appearances on Bell's program have gone a long way toward making him well known outside of ham radio. Most of Bell's estimated ten million nightly listeners are not hams. Green and Bell spend very little time talking Amateur Radio, but the few minutes the two take to bash the politics of the ARRL are more than enough to catch the attention of any ham dialing by. Love him or hate him, they all want to hear more and read more. If a listener is not a *73* subscriber when they tune in, the chances are that a good number of them will be when

the sun comes up the next morning. Green is the “penultimate salesman.”

Green is again including a bit of his anti-ARRL rhetoric in his editorials. He also regularly targets several other hams whom he seems to believe are detrimental to the survival of the service.

Another change at *73* is more subtle. Except for Green's editorials, *73* has returned almost one-hundred percent to ham radio. It has far more “easy to replicate” construction articles than any other magazine. Many are designed using parts available at any neighborhood Radio Shack store. It also has ample yet easy-to-understand technical articles. Most important, *73* has been able to keep most of its most popular columnists even through the worst of financial times.

While Green is the “idea man” at *73*, its Executive Editor, Jack Burnett, is the “solid thinker” who can get any job done. During his reign at the *73* helm back in the '80s, he became one of the most trusted and well respected members of the Amateur Radio business community. He delivered on every promise and by doing so he gained everyone's admiration and respect. And like the match of Green with Bell on the public relations front, the coupling of Green with Burnett — and others like him — ensures that the quality of *73* will only get better as time goes on.

So, slowly, ever so slowly, advertisers and readers are coming back to *73*. They look to it as an alternative to the ARRL's very conservative politics. It's also looked at as a substitute for other magazines that seem to have no ham radio political view at all. Green and his staff know that their survival depends on having the “ham in the street” as readers and subscribers. They know that the niche exists for a politically motivated magazine that also provides easily replicable and easy-to-construct projects. And that is the road Green is now directing *73* toward in his new masthead title of “El Supremo and Founder.”

The only question is, When will the major Pacific-rim ham radio manufacturers return to *73* in force? With Japan's economy still in decline, it could be a long time. They are still cutting back their level of advertising in all other ham radio magazines, including the mainstay *QST*.

But Green does not seem to care. Thanks

*Continued on page 56*



# 6m Fun Loop

*A low-cost gain antenna for the VHF technician.*

*Six meters is a good band for experimenters and new hams to try out. Transmitter and receiver circuits are reasonably easy to build without exotic mechanical construction, and antennas are reasonably sized.*

A loop antenna is an excellent construction project that can be completed in one afternoon. It will provide gain over a dipole without reducing horizontal coverage. Gain is achieved by reducing the energy that is normally directed vertically from a dipole, and directing it out horizontally where it can do some good. A loop therefore provides about twice as much RF signal as a dipole when transmitting. It also captures twice

the signal on receive without increasing thermal noise, improving the received signal-to-noise ratio by a factor of two.

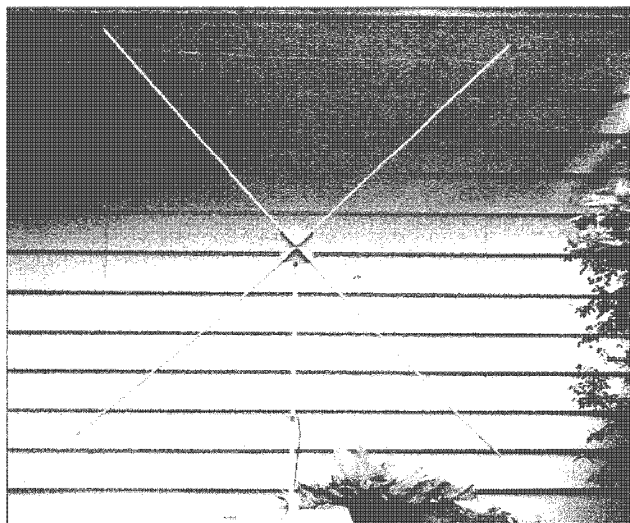
A loop can be round, square, triangular, or rectangular, with only small differences in performance.

## Construction details

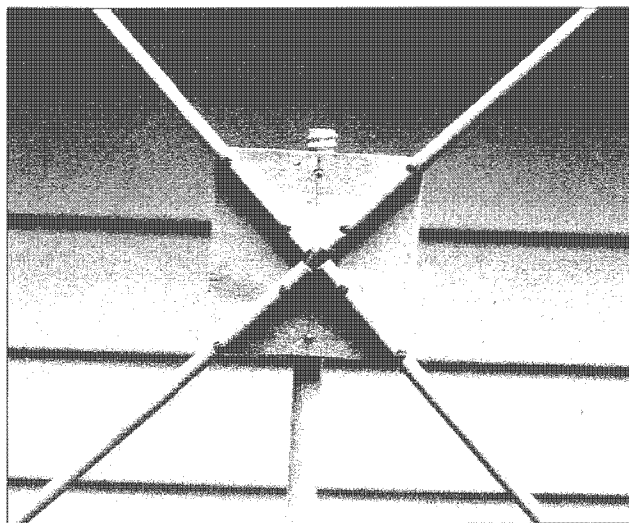
You will need four wood dowel rods 7/16" by 48" long for the spreaders. These are available at any building supply or hardware store. Mine are poplar,

but any hardwood will be satisfactory. You will also need a 5-1/2" square piece of plywood, 3/8" thick. Eight machine screws 6-32 by 1" long with nuts hold the spreaders to the plywood. See **Photo B** for mounting details.

The loop wire is solid copper #14 HF insulated. It is supported by passing through a 1/8" hole in each spreader. The holes are 4-1/2" in from the far end of the 48" spreaders. With this dimension, the loop will resonate



**Photo A.** Six meter loop set up for testing.



**Photo B.** Close-up view of the spreaders.



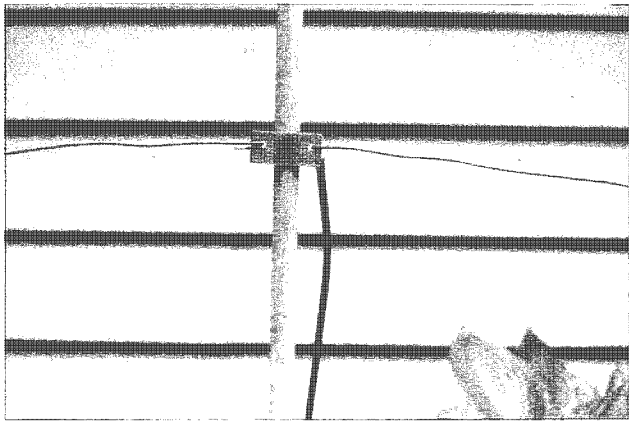


Photo C. Bottom feed insulator.

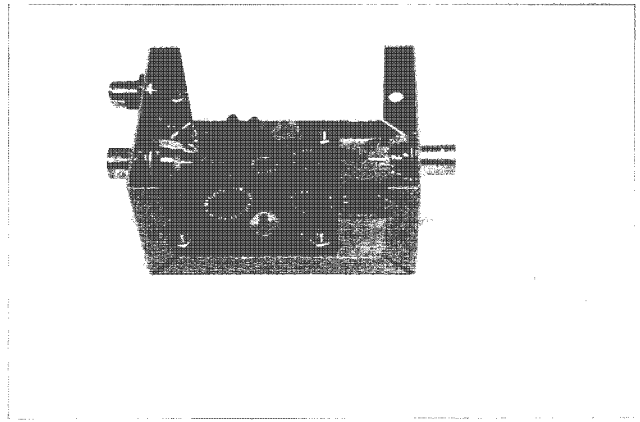


Photo D. Six meter power amplifier — 2 watts.

at 50.2 MHz. For higher frequencies, the loop can be made proportionally shorter by drilling these mounting holes farther in on the spreaders.

For horizontal polarization, the loop is fed at the bottom center using coax cable and a center insulator. See **Photo C**. Note, however, that a loop has an impedance of about 100 ohms at resonance. In order to match this to a 50 ohm coax, a Q-section of 75-ohm coax is used. The Q-section is just a quarter wavelength of RG-59/U coax. I used Radio Shack RG-59/U foam E111378A 42" long. The length is not very critical, as the Q-section will work over a bandwidth wider than the entire 6 meter band. One end of the Q-section coax connects to the loop. Connect the braid to one end of the loop and center conductor to the other

loop end. The far end of the Q-section is then connected to a 50-ohm feedline of any length necessary to reach the shack. I used Carol RG-58/U E18621-8 coaxial cable of 25-foot length.

### Measurement

The loop antenna has a relatively wide bandwidth. See the measurement results in **Fig. 1**. These were taken with an MFJ-259 SWR Analyzer at the end of the 25-foot feedline. Without a Q-section, the SWR would never drop below 2:1.

### Driving the loop on transmit

One nice feature of the 6-meter band is that low-cost power transistors developed for CB transmitters can be used to produce power output on this

band. All of the following work well — Motorola MRF476, and Japanese 2SC1306, 2SC1678, 2SC2075, and 2SC2078, producing over 2 watts output at 50 MHz with a 12-volt supply. A power amplifier kit, shown in **Photo D**, is available from Unicorn Electronics, 1 Valley Plaza, Johnson City NY 13790; 1-800-221-9454; [www.unicorn-elex.com].

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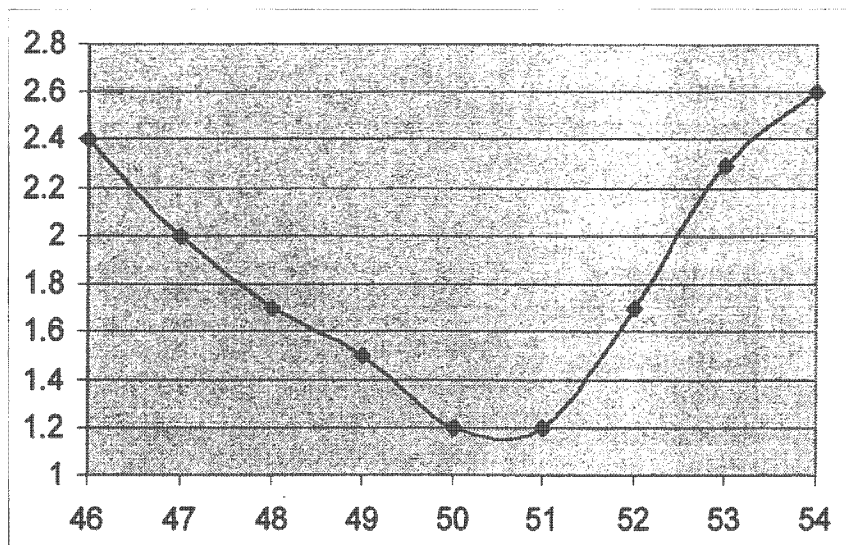


Fig. 1. SWR of the loop.

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# Roll Your Own RF Transformers

*But don't get TOO wound up in it.*

*Have you ever looked at a schematic that included a broadband RF transformer and wondered how the author ever determined that it should be 10 turns bifilar-wound of number 32 wire on an T375-43 core? While this article isn't going to make you into a full-fledged radio engineer, with a few simple calculations, you too can design and build your own broadband transformers.*

**T**his article will concentrate on low-power designs, suitable for receivers or QRP transmitters. But, similar concepts apply to high-power designs. It considers only "conventional" transformers, not transmission line or balun designs. Jerry Sevick's classic book, *Transmission Line Transformers* (ARRL, 1987), remains the most accessible reference for those interested in transformers using transmission line techniques.

Transmission line transformers should be considered where DC isolation isn't necessary and where the desired transformation ratio can be achieved. If not, then a conventional transformer is required.

## Ideal transformers

First, a quick review of "ideal" transformers. An ideal transformer has no losses; all of the power in the primary appears in the secondary. The relationship between the turns ratio  $N$ , primary voltage  $E_{PRI}$ , secondary voltage  $E_{SEC}$ , primary current  $I_{PRI}$  and secondary current  $I_{SEC}$  are governed by simple relationships:

$N = \text{Number of Secondary Turns} / \text{Number of Primary Turns}$

$$E_{SEC} = N \times E_{PRI}$$

$$I_{SEC} = I_{PRI} / N$$

In an AC circuit, impedance  $Z$  is the ratio of voltage to current.  $E$ ,  $I$ , and  $Z$  are, strictly speaking, complex, and may have both real and imaginary components. We'll simplify things as much as possible and deal chiefly with the magnitude of  $E$ ,  $I$ , and  $Z$ .

$$Z_{PRI} = E_{PRI} / I_{PRI}$$

$$Z_{SEC} = E_{SEC} / I_{SEC}$$

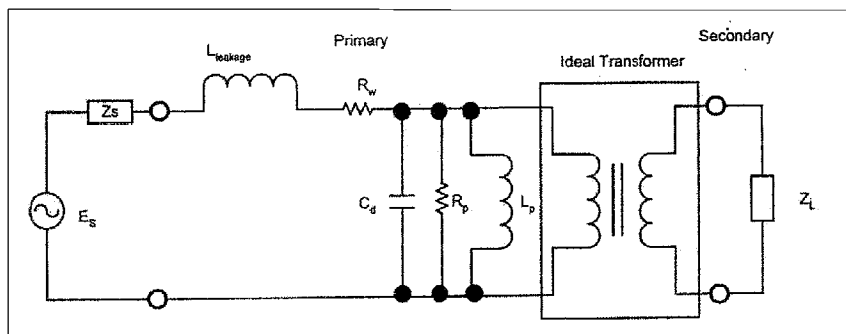
$$Z_{PRI} = Z_{SEC} / N^2$$

The last equation is important; a transformer "alters impedance by the square of the turns ratio."

## Not-so-ideal transformers

Unfortunately, none of my radio parts catalogs has a part number for an "ideal transformer." We instead have to deal with transformers that exhibit leakage inductance, core loss, winding loss, distributed capacitance, and other real-world factors.

One simple yet accurate model of a practical transformer is shown at **Fig. 1**.  $L_p$  and  $R_p$  are the parallel inductance and resistance of the core,  $R_w$  is the winding resistance,  $C_d$  is the distributed



**Fig. 1.** Equivalent circuit of a transformer.



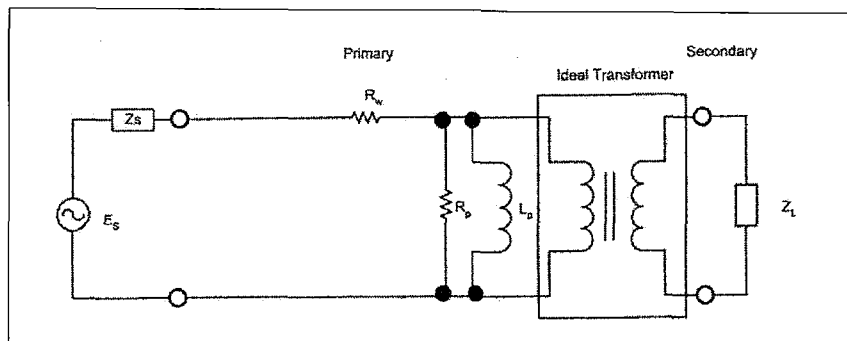


Fig. 2. Simplified low-frequency equivalent circuit.

capacitance, and  $L_{leakage}$  is the leakage inductance.  $Z_s$  and  $Z_L$  are the source and load impedances. Note that all of these parasitic elements are shown in the primary circuit, although, of course, they are also found in the secondary. When necessary, the value of these parasitic elements can be adjusted to represent both primary and secondary loss elements.

We can further simplify Fig. 1 by separately examining the low- and high-frequency responses. At low frequencies, a well-designed transformer will exhibit small leakage reactance ( $2\pi FL_{leakage}$ ) and thus  $L_{leakage}$  can be neglected. Likewise, at high frequencies the primary inductance reactance ( $2\pi FL_p$ ) is large and  $L_p$  can be neglected. Figs. 2 and 3 show the simplified low- and high-frequency models.

What then determines the low- and high-frequency performance of our real-world transformer? Looking at Fig. 2, we see that we want low  $R_w$  and high  $R_p$  and  $L_p$ . For high frequency, we again want low  $R_w$  and high  $L_p$ , but we also need low  $L_{leakage}$  and low  $C_d$ . In fact, if  $L_{leakage}$  and  $C_d$  in Fig. 3 remind you of a low-pass filter, you're right. It is a low-pass filter.

### Design methodology

Our design objective is to pick a core material providing an acceptable  $R_p$  and windings that meet the  $R_w$  and  $L_p$  objectives.  $L_{leakage}$  and  $C_d$  are tough to explicitly design for as they depend mostly on the configuration of the windings. Hence, for the purpose of our simplified design approach the high-frequency response is pretty much what you get.

We will use an example of a wide-band transformer to match 50 ohms to 300 ohms, with a response no worse than 3 dB down over a frequency range of 3–30 MHz. This transformer might be used, for example, to connect a vintage tube-type shortwave receiver with a 300-ohm balanced antenna input to a 50-ohm coaxial fed antenna.

Here's a step-by-step approach to meeting these objectives:

1. Calculate  $L_p$ , given  $F_L$ , the desired low-frequency cutoff point in MHz, and  $Z_s$ , the primary source impedance. Use Table 1.

- If the transformer matches 50 ohms

Continued on page 14

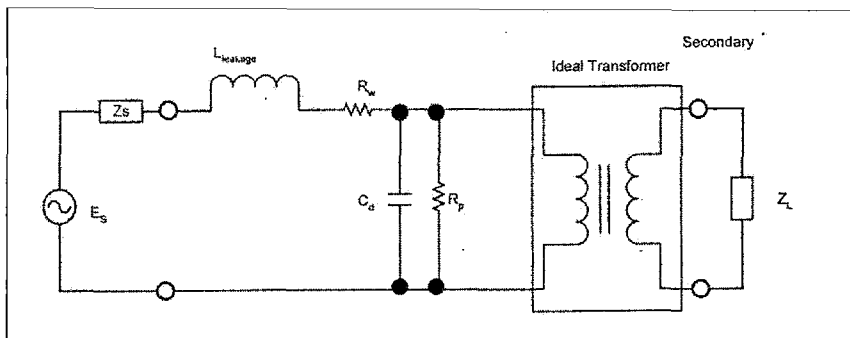


Fig. 3. Simplified high-frequency equivalent circuit.

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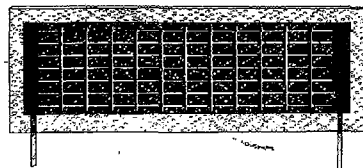
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Low-Frequency Loss (dB)	Constant $k_1$	Constant $k_2$
0.5	0.227	11.4
1	0.156	7.8
2	0.104	5.2
3	0.080	4.0

**Table 1.** Calculating  $L_p$ . For the more mathematically inclined, **Table 1** is derived from the following equation:

$$L_p \geq \frac{R}{\omega} \sqrt{\frac{1}{10^{L/10} - 1}}, \text{ where } \omega = 2\pi F, I.L.$$

= insertion loss in dB, and  $R$  is the parallel combination of the source resistance  $R_s$  and the load resistance  $R_L$ , with  $R_L$ 's value reflected back to the primary side. In the normal case,  $R_s = R_L$  after reflection; hence  $R = R_s/2$ .

## Roll Your Own RF Transformers

continued from page 13

to another impedance, you can use the simplified formula:  $L_p \geq k_2/F_L$ .

$L_p$  is the minimum inductance in  $\mu\text{H}$ , and  $F_L$  is the low-frequency response frequency in MHz. Select  $k_2$  from **Table 1** depending upon the rolloff you desire at the low-frequency cutoff point. (The calculations behind **Table 1** ignore  $R_p$ , so the actual losses will exceed those predicted; hence we will design for a 2 dB loss to ensure that we meet our 3 dB target.)

In our sample design, we want not more than 3 dB loss at 3 MHz. To provide a bit of a safety margin, we will use  $k_2 = 5.2$ , corresponding to 2 dB loss.

$$L_p \geq 5.20/3 \geq 1.73 \mu\text{H}$$

• If the transformer matches non-50-ohm source impedance  $R_s$ , use  $k_1$  from **Table 1**.

Mfr.	HF Core Material & $\mu_r$	VHF Core Material & $\mu_r$
Fair-Rite	Type 43, $\mu_r = 850$	Type 61, $\mu_r = 125$
Ferronics, Inc.	Type J, $\mu_r = 850$	Type K, $\mu_r = 125$

**Table 2.** Commercial identifiers of suitable ferrite mixes from two widely available manufacturers.

						$A_p$ (nH)	
Fair-Rite P/N	OD (in.)	ID (in.)	Thick (in.)	$l_e$ (cm)	$A_e$ (cm <sup>2</sup> )	Type 43	Type 61
5943000801	0.155	0.088	0.050	0.92	0.011	96	N/A
5943002101	0.190	0.090	0.050	1.04	0.015	128	N/A
59XX000101	0.230	0.120	0.060	1.30	0.020	132	25
59XX000201	0.375	0.187	0.128	2.07	0.072	300	55
59XX000301	0.500	0.281	0.188	2.95	0.129	375	69
59XX001101	0.500	0.312	0.250	3.12	0.150	410	65
59XX001901	0.500	0.312	0.500	3.12	0.299	820	150
5943005101	0.630	0.378	0.182	3.85	0.145	320	N/A
59XX004901	0.630	0.378	0.250	3.85	0.199	440	80
59XX000501	0.825	0.520	0.468	5.20	0.460	750	135
59XX001801	0.870	0.540	0.250	5.40	0.262	410	75
5943007601	0.870	0.540	0.500	5.40	0.520	820	N/A
5943001301	1.000	0.610	0.250	6.20	0.308	425	N/A
5943001401	1.000	0.610	0.320	6.20	0.410	560	N/A

XX = either 43 or 61

**Table 3.** Ferrite core properties (Fair-Rite).

$$L_p \geq R_s k_1 / F_L$$

For example, if our transformer is to match 75 ohms to 300 ohms with no more than 3 dB loss at 10 MHz, what is the minimum  $L_p$ ? (Again, for a safety margin we will use  $k_1 = 0.104$ , corresponding to 2 dB loss.)

$$L_p \geq (0.104 \times 75)/10 \geq 0.78 \mu\text{H}$$

2. Calculate the turns ratio, given  $Z_s$  and  $Z_L$ . The turns ratio is determined by the ideal transformer equation.

$$N^2 = Z_L / Z_s, \text{ or}$$

$$N = \sqrt{\frac{Z_L}{Z_s}}$$

Substituting values for our 50 ohm to 300 ohm transformer, we calculate  $N$ :

$$N = \sqrt{\frac{300}{50}} = \sqrt{6.00} = 2.45$$

Since  $N$  is not an integer, we cannot easily use a multifilar winding approach.

3. Preliminary considerations in selecting the core and calculating the number of turns. For a variety of reasons, including self-shielding properties and

wide availability, we will consider only toroid core forms.

Here's where some judgment comes in. For broadband transformers in the HF range, experience shows a core with a relative permeability ( $\mu_r$ ) of 800–1,000 works well for HF, and that a relative permeability of 100–150 is suitable for VHF. **Table 2** shows the commercial identifiers of suitable ferrite mixes from two widely available manufacturers.

Since our target is for 3–30 MHz, we decide, therefore, to use Fair-Rite Type 43 material.

Next, we wish to select the physical core size. Since we are only considering receive-only or very-low-power transmit applications, our core selection will not be driven by power dissipation concerns. Rather, we must balance the following considerations:

- To keep  $R_w$  down, we should use the largest practicable wire size. The larger the core, the larger the wire size. Fortunately, for practical transformers working with impedances of a few hundred ohms,  $R_w$  isn't a critical factor for any practical wire size.

- In a toroid transformer, leakage inductance in  $\mu\text{H}$  is approximated by



Fair-Rite P/N	Turns 43 Material	Turns 61 Material
5943000801	4.25	N/A
5943002101	3.68	N/A
59XX000101	3.62	8.32
59XX000201	2.40	5.61
59XX000301	2.15	5.01
59XX001101	2.05	5.16
59XX001901	1.45	3.40
5943005101	2.33	N/A
59XX004901	1.98	4.65
59XX000501	1.52	3.58
59XX001801	2.05	4.80
5943007601	1.45	N/A
5943001301	2.02	N/A
5943001401	1.76	N/A

XX = either 43 or 61

Table 4. Number of turns to yield 1.73  $\mu\text{H}$ .

the formula

$$L_{\text{leakage}} \approx 292N \frac{1.065A_e}{\ell_e}$$

where  $A_e$  and  $\ell_e$  are determined from the physical size of the core.  $A_e$  is the effective cross-section of the core in  $\text{cm}^2$  and  $\ell_e$  is the effective path length in cm (this is approximately the mean circumference of the core). Both  $A_e$  and  $\ell_e$  are tabulated by the core manufacturers. To keep  $L_{\text{leakage}}$  down, we should keep  $N$  as small as possible and pick a core with a small  $A_e$  but large  $\ell_e$ .

• The larger the core, the greater the cost and the greater the space required on the circuit board.

• Our target has a turns ratio of 2.45:1. Since you can't wind a fractional turn, if we only have a few primary turns we may be unable to accurately achieve our desired turns ratio. In our example with  $N = 2.45$ , should the primary require 3 turns, the secondary must have 7.348 turns. Since we can only wind 7 turns or 8 turns on the secondary, our achievable  $N$  then becomes either 2.33 or 2.67. Instead of transforming 50 ohms into 300 ohms, we would instead have 272 ohms (7 turns) or 355 ohms (8 turns). Whether

this deviation is important or not depends upon the application. The larger the core, the fewer the turns required to meet a specific  $L_p$  target. Therefore, a smaller core will give greater turns ratio flexibility.

• The smaller the core, generally speaking, the better the high-frequency response holds up.

4. Selecting the core and calculating

Primary Turns	Secondary Turns	ZL	Error from 300 Ohms
2	4	200	33%
2	5	313	-4%
2	6	450	-50%
3	6	200	33%
3	7	272	9%
3	8	355	-19%

Table 5. Possible designs.

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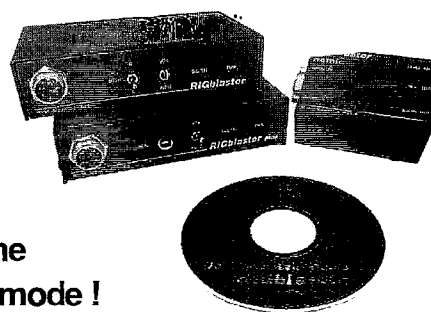
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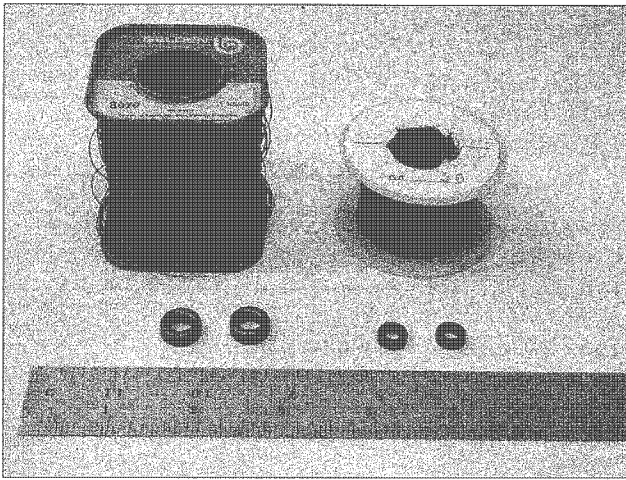
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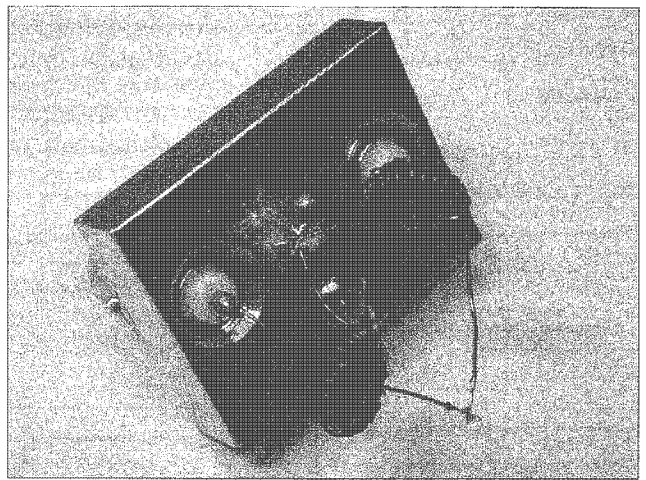
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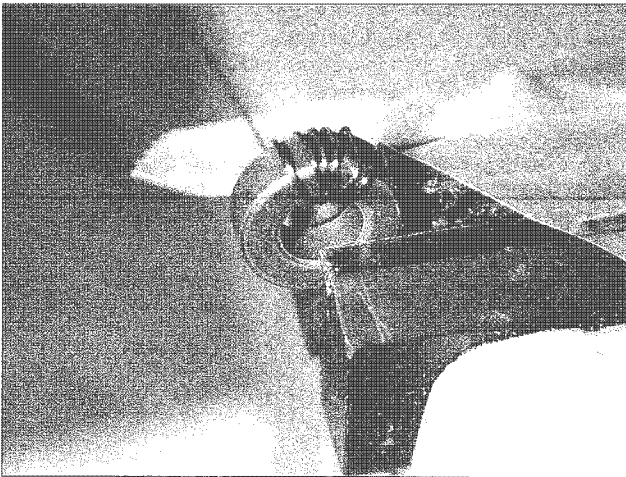




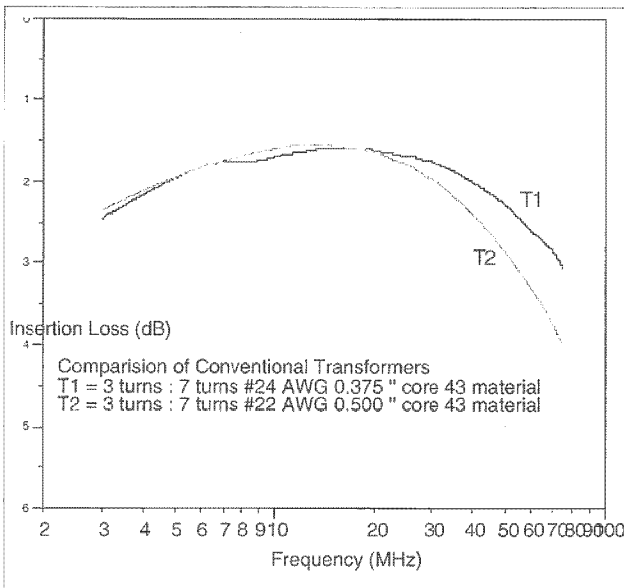
**Photo A.** Ingredients for winding a transformer — wire and ferrite cores.



**Photo C.** Two transformers wound and connected back-to-back for loss measurements.



**Photo B.** Partially wound transformer.



**Fig. 4.** Frequency response of 50:300 ohm transformers for 3/8-inch and 1/2-inch core diameter.

number of turns. Let's calculate a few possible configurations. This task is simplified if a spreadsheet program, such as Microsoft Excel, is used. I've reproduced the characteristics of a selection of Fair-Rite cores in **Table 3**. (Since we are dealing with receive or low-power operations, I've only shown cores up to 1 inch in diameter.)

Given an  $A_L$  value, the following formula determines the number of turns required to yield a particular inductance, where  $L$  is in  $\mu\text{H}$ :

$$N = \sqrt{\frac{L \times 1000}{A_L}}$$

For our required 1.73  $\mu\text{H}$ , and for a 5943000201 core, with  $A_L = 300$  we can calculate the number of primary turns required:

$$N_{\text{PRI}} = \sqrt{\frac{1.73 \times 1000}{300}} = \sqrt{5.76} = 2.40 \text{ turns} \dots$$

**Table 4** shows the same calculation for all the possible combinations that yield 1.73  $\mu\text{H}$ .

My junkbox yielded both the -0201 and -0301 cores, so let's look at those in more detail. Both require 2 and a fraction turns. We can't wind a fractional turn, and our calculation yields a minimum inductance, so we should consider 2 or 3 primary turns.

We can then calculate the  $Z_L$  possible with 2 or 3 primary turns, as shown in **Table 5**.

A 2-turn primary would be risky, since we determined that more than 2 turns was the minimum requirement. We want to keep the number of turns as low as feasible to preserve the high-frequency response. Hence, our design will use 3 primary turns and 7 secondary turns with a theoretical error of only 9% from the desired 50:300 ohm transformation. The core will therefore have a total of 3 primary + 7 secondary = 10 turns.

Deciding between a -201 and -301 core is a less critical choice. On one hand, the smaller core should provide better high-frequency performance, since the windings are smaller and will exhibit less  $C_d$ . On the other hand, we will see slightly less loss with the larger core.



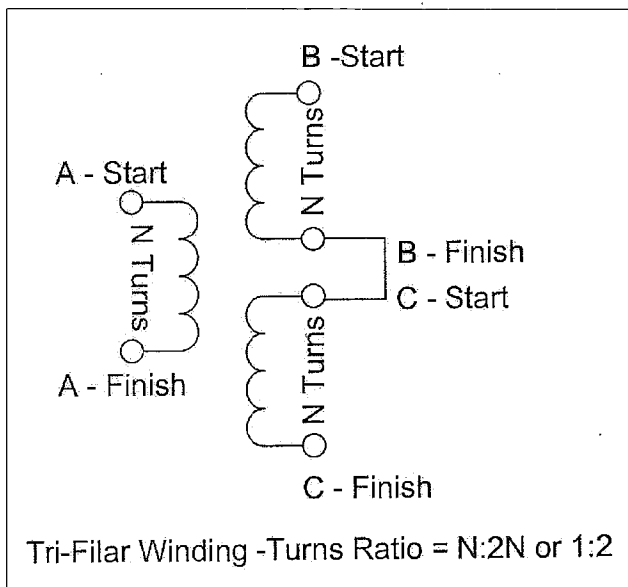


Fig. 5. Connections in trifilar transformer.

A good rule of thumb is that windings should occupy about 75% of the core circumference. The inner diameter is the limiting factor if we wish to avoid wire overlap. (Overlap increases  $C_d$  and therefore hurts high-frequency response.)

The inner diameter of the -201 core is 0.187 inches, which yields a circumference of 0.294 inches [circumference =  $(\pi \times \text{diameter})/2$ ]. 75% of this length is 0.220 inches. This means that the maximum wire diameter is  $0.220 \div 10 \text{ turns} = 0.022$  inches, corresponding to #23 AWG (#22 or #24 wire would be suitable). Performing the same calculations for the -301 core gives a maximum wire size of #20 AWG.

Thus, our two candidate transformers T1 and T2 are:

- T1: 3 primary turns of #24 AWG and 7 secondary turns of #24 AWG on a 0.375-in. diameter toroid core using FairRite 43 material.

- T2: 3 primary turns of #22 AWG and 7 secondary turns of #22 AWG on a 0.500-in. diameter toroid core using FairRite 43 material.

Let's see how these paper designs perform.

### Test results

We will measure the "insertion loss" of T1 and T2. The insertion loss compares the load power available with the transformer in the circuit versus the load power with the transformer out of the circuit. Insertion loss consists of both true transformer loss (core loss and winding loss) and mismatch loss caused by the transformer impedance not matching the source or load impedances. Both losses are commonly combined and referred to as the insertion loss.

While it's possible to measure the insertion loss and frequency response of a single transformer, accurately measuring power at two impedance

levels — 50 ohms and 300 ohms in our design example — is tricky. Almost all RF test equipment is based on 50 ohms, so our job is easier if both the source and load impedance can be made to look like 50 ohms. The simple solution is to wind two identical transformers and couple them back-to-back, thus yielding 50 ohms source and load. In this case, of course, the loss of each individual transformer is one half of the total loss.

I wound two identical transformers on -201 cores with 3 primary and 7 secondary turns (T1), and two on -301 cores (T2). I then connected these back-to-back and ran a series of insertion loss measurements using a Hewlett-Packard 8754A scalar network analyzer. **Photo C** shows the simple test fixture I made to hold the transformers. As can be seen from **Fig. 4**, either design meets our requirements, although the physically

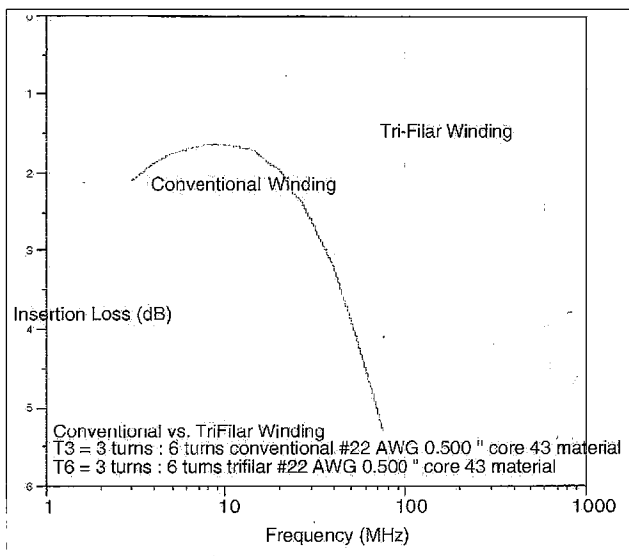


Fig. 6. Frequency response for 50:200 ohm transformers, conventional versus trifilar-wound.

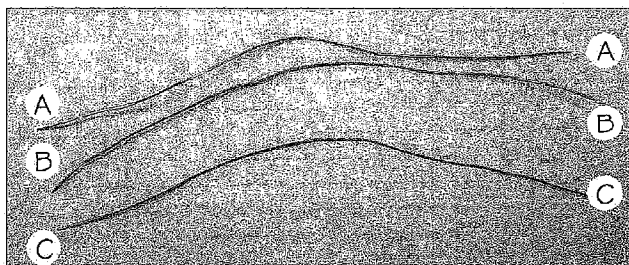


Photo D. To make a trifilar winding, measure three equal lengths of wire.

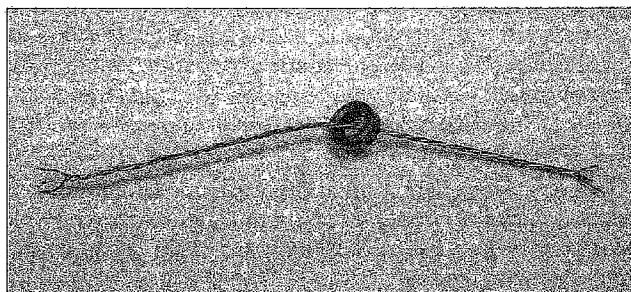


Photo E. Twist the three wires together and wind the transformer.



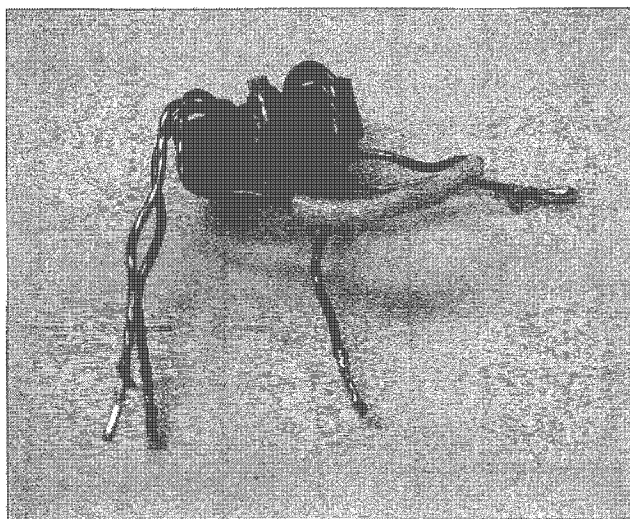


Photo F. Completed transformer.

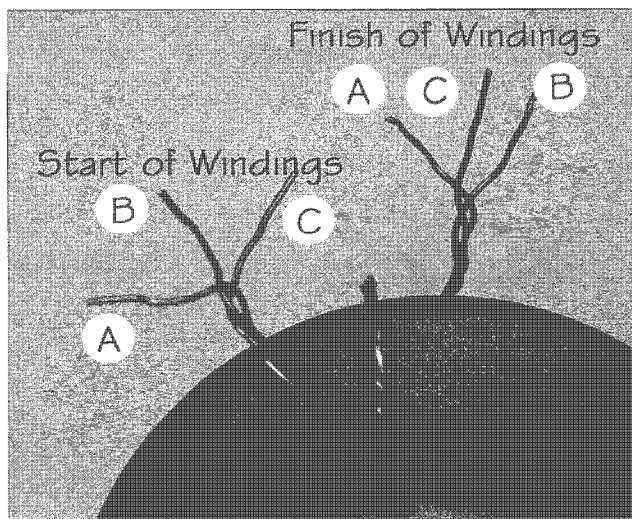


Photo G. Trifilar ends before connection.

smaller T1 offers slightly better high-frequency performance.

If we put a 300-ohm resistor across the secondary winding of our transformer, we should expect the primary to measure 50 ohms impedance, right? If we had a perfect transformer, this is exactly what we would see. However, our transformer model predicts that we will see something other than 50 ohms. The "ideal transformer" part of our model changes the 300-ohm load into 50 ohms. The load resistance, however, is in parallel with  $R_p$  and  $L_p$  and is in series with  $R_w$  and  $L_{leakage}$ . Thus, we would expect to see less than 50 ohms, and we expect a series inductance component. In fact, at 10 MHz, with a 300-ohm resistor across the secondary, I measured the primary impedance  $Z_{in}$  as  $34 + j17$  ohms. This value is in excellent agreement with calculated results based upon the transformer equivalent circuit parameters I measured at 10 MHz:  $L_{leakage} = 0.119 \mu H$ ,  $R_w = 0.25$  ohms,  $L_p = 2.23 \mu H$ , and  $R_p = 160$  ohms.  $C_d$  is about 2 pF.

### Can we do better?

While both T1 and T2 meet our design objective, the midband insertion loss is 1.5 dB, and the high-frequency performance isn't spectacular.

If we can live with a turns ratio of 1:2, 1:3, etc., we can significantly improve both the midband insertion loss and high-frequency response by multifilar winding. Multifilar is a \$10

word that simply means that wires comprising the winding are paralleled before winding. In practice, the wires are twisted together to form a single strand and the strand is then wound through the core. Since the primary and secondary windings are wound in parallel, each strand must have the same number of turns. Thus, the turns ratio is defined by the number of strands in the multifilar winding. If we have two strands (one primary and one secondary), the turns ratio is 1:1; if we have three strands (one primary and two secondary), the turns ratio is 1:2 — and so forth. The secondary strands are then connected in series, as illustrated in Fig. 5. (It is possible to tap a multifilar winding to yield a fractional turn, and this technique, although mechanically inconvenient, should be considered where necessary.) Photos D through H illustrate the steps in winding a multifilar transformer.

To investigate the degree to which a multifilar winding improves transformer performance, I wound two pairs of 1:2 transformers, one pair with conventional windings and one pair trifilar-wound. All transformers had 3 primary turns and 6 secondary turns and used a -301 core. These transformers were designed using the method developed earlier, with 3 MHz as low-frequency response target but with an impedance ratio of 50 ohms: 200 ohms. The trifilar winding used 3 strands of #22 AWG magnet wire,

twisted together tightly, around 15-turns-per-inch-wound.

I tested the insertion loss using the same back-to-back method described earlier. Although I knew that the trifilar-wound transformer would outperform the conventional winding, I didn't expect the difference to be so marked. The 3 dB bandwidth of the conventional transformer extended to 35 MHz; the trifilar transformer frequency response extended to over 600 MHz. The midband insertion loss also improved from 1.6 dB to 0.9 dB.

### DC current in a winding

The procedures I've discussed can be applied directly if the transformer windings don't carry DC current. In some applications, however, DC is carried in one or more of the transformer windings — for example, where the transformer is in the collector circuit of a transistor.

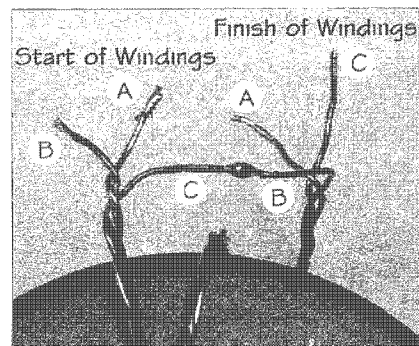


Photo H. How to connect the trifilar windings.



The DC current, if sufficiently large, will saturate the core and reduce the effective inductance of the windings. It can also cause nonlinear operation. The usual recommendation is to use a core with a small air gap, but air-gapped cores are not readily available to the experimenter. In the absence of a gapped core, the builder should use a physically larger nongapped core and increase the number of turns. References 2 and 3 should be consulted for further information if significant DC currents are to be carried in a transformer. With practical-size cores, a few milliamperes in the primary won't significantly change transformer performance.

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3. M.F. "Doug" DeMaw, *Ferromagnetic Core Design & Application Handbook*, MFJ Publishing, Starkville, MS (1st ed., 1996).
4. Technical Note TN69, Midcom, Inc., available over the Internet at [<http://www.midcom-inc.com/pdf/TN69.pdf>].
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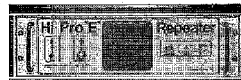
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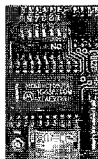
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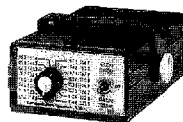
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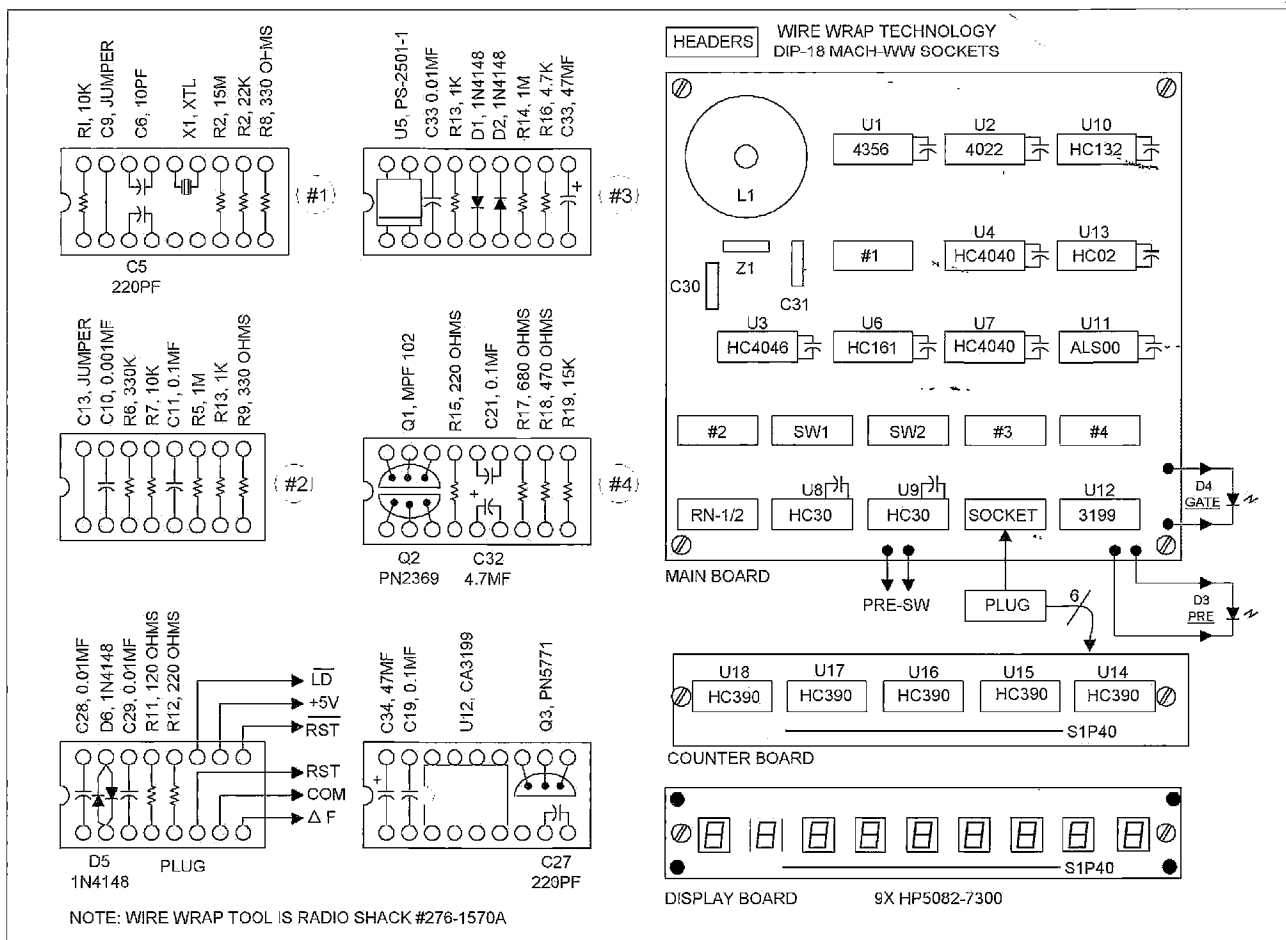


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Now, let's consider the assembly. Originally I used wire-wrap technology to do the prototype. It worked out very well for me. FAR Circuits offered to do the printed circuit board and offer it for sale to the builder, so I am listing FAR Circuits as a possible source of a PC board set. This article uses wire-wrap



**Fig. 6.** Notes: (1) If wire-wrap technology is used, then DIP-18 WW sockets must be used to allow the 0.1  $\mu$ F capacitors to be inserted between pins 9 and 10 of the socket (pins 8 and 9 of DIP-14). (2) If DIP sockets with 0.1  $\mu$ F caps between pins 16 and 8 Vdd, Vss (DIP-14 = 14 and 7) are used, then no 18-pin sockets are needed. (3) In this article, MF in schematics is meant to indicate  $\mu$ F.



Parts List — part 1				
Qty.	ID	Description	P/N	Vendor
2	SW1, SW2	8-pos (DIP16) DIP switches	38842	1
1	ENC	Enclosure Ten-Tec model JW7	JW6	3
1	PCB	PC board set (3 boards)	K8IHQ	6
1	Alt-PCB	PC perforated board CEM	574-169P44	2
1	WC	6 VDC 800 mA (reg.) wall converter	56-586	5
1	PI	DIP16 (machine pin) ST socket (plug)	37401	1
7		DIP16 WW (mach. pin) socket	21-220	5
16		DIP18 WW (mach. pin) socket	21-180	5
3	SO1-SO3	DIP24 WW (mach. pin) socket (LEDs)	21-184	5
1	X1	32768 Hz quartz watch crystal	X801	4
2	S1, S2	DPDT (2-pos.) sub-mini toggle switch	75977	1
1	U1	4536 CMOS IC (DIP16)	511-4536	2
1	U2	4022 CMOS IC (DIP16)	511-4022	2
1	U3	74HC4046 CMOS IC (DIP16)	45938	1
2	U4, U7	74HC4040 CMOS IC (DIP16)	45920	1
1	U5	PS-2501-1 optocoupler (DIP4)	551-PS2501-1	2
1	U6	74HC161 CMOS IC (DIP16)	45452	1
2	U8, U9	74HC30 CMOS IC (DIP14)	45786	1
1	U10	74HC132 CMOS IC (DIP16)	45321	1
1	U11	74ALS00 ALS IC (DIP14)	605-74ALS00AN	2
1	U12	CA-3199-E IC (DIP8) prescaler	—	8
1	Alt-U12	UPB-1509-GV (NEC) (SO-8) MMIC	UPB-1509-GV	4
1	U13	74HC02 CMOS IC (DIP14)	45188	1
1	U14	74F160 IC (BCD) (DIP16)	74F160APC	4
4	U15-U18	74HC390 CMOS IC (DIP16)	511-M74HC390	2
1	O1	MPF102 (2N5486) JFET (TO-92)	26403	1
1	Q2	2N2369A NPN transistor (TO-92)	610-PN2369A	2
1	Q3	2N5771 PNP transistor (TO-92)	RSU-11416229	7
4	D1, D2, D5, D6	1N4148 silicon SW diodes	36038	1
1	D3	Prescale LED (T-1) 3mm green	25-302	5
1	D4	Gate LED (T-1) 3mm yellow	25-285	5
9	DS1-DS9	7-seg. LED displays 0.3 in. red (HP-5082-7300)	173833	1
1	BZ	PMI black bezel (3.6 in.)	PRD-360-B	4
1	BZ	PMI red bezel (3.6 in.)	PRD-360-R	4
1	BZ	PMI clear masked lens (3.6 in.)	PRD-360-W1	4
1	—	0.25 in. grommet	64-3025	7
4	—	0.25 in. 4-40 standoff hardware	133639	1
6	—	0.5 in. 4-40 nylon standoffs and screws	28-145	5

Table 1. Parts list.

technology. I do recommend the PCB, since this is a fairly complex instrument which allows plenty of chance for mistakes in the wire-wrap version.

Many of the components are mounted on 18-pin wire-wrap sockets used as headers. The headers are then mounted to the circuit board. Details of these headers are provided in **Fig. 6**. (See part 1 for Figs. 1-5 and Photos A and B.)

The prescaler is either RCA type CA-3199-E (DIP-8) or NEC UPB1509 (SO-8). You will save some work if you can locate the RCA part, because it is an 8-pin DIP and can be inserted directly into its header socket. RCA has discontinued the device, but you may still find it in stock at some vendors.

If you cannot obtain the CA-3199-E, use the NEC UPB1509, which is a surface-mount technology (SMT) device. Glue the device to a DIP-8 machine pin socket, and wire it as shown in **Fig. 7** — easy on the heat! Insert the socket carrying the UPB1509 into its header. There is an order and wait situation for the UPB1509 since they are used in the cellular telephone industry. I waited nearly 60 days for delivery.

Mount the assembled PCB using aluminum 0.25" standoffs and #4 hardware. Ensure that the ground/common is connected to the enclosure (aluminum case) bottom. I hard-wired the wall converter in place. Use a grommet to go through the rear of the enclosure, and tie a knot in the wire inside the enclosure. That should do it! Go slowly and be careful!

Let's get to the details of construction. If using a PC board, it is best to solder the ICs and sockets in before other parts. Heat and solder both sides of the PCB if available since some of the interconnects are made through the legs of the IC or IC sockets. Before using the PCB make a couple of photocopies. Put a bottom and top together and staple all four corners. Hold it up to the light to ensure alignment is present. As each socket or IC is inserted and soldered, check continuity from point-to-point. When confirmed, use a yellow marker to mark the schematic traces as they are tested. This is the best way to



## Parts List — part 2

Qty.	ID	Description	P/N	Vendor
1	CN	SIP40 interconnect header	160881	1
2	RN1, RN2	10k x 9-resistor net (SIP10) (cut off pin 10)	24643	1
1	CB	10 ft. RG-174/U mini-coax cable	60-238	5
1	C1	1000 $\mu$ F 10 V elect cap radial	647-UVR1A102MPA	2
22	C2-C23	0.1 $\mu$ F 20% 50 V mono cap radial	21RZ310	2
2	C24, C27	220 pF 10% 50 V NPO mono cap radial	21RD622	2
1	C25	10 pF 10% 50 V NPO mono cap radial	21RD710	2
1	C26	0.001 $\mu$ F 10% 50 V X7R mono cap radial	21RX510	2
4	C28-31	0.01 $\mu$ F 10% 50 V X7R mono cap radial	21RX410	2
1	C32	4.7 $\mu$ F 10 V tant cap radial	80-T350A475K010	2
2	C33, C34	47 $\mu$ F 10 V elect cap radial	140-MLRL10V47	2
4	R1,R4,R7,R20	10k 5% CF 1/4 W resistor	29911	1
1	R2	15 meg 20% CF 1/4 W resistor	291-15M	2
1	R3	22k 5% CF 1/4 W resistor	30453	1
2	R5, R14	1 meg 5% CF 1/4 W resistor	29698	1
1	R6	220k 5% CF 1/4 W resistor	-----	1
2	R8, R9	330 5% CF 1/4 W resistor	30867	1
2	R10, R16	4700 5% CF 1/4 W resistor	31026	1
1	R11	120 5% CF 1/4 W resistor	30082	1
2	R12, R15	220 5% CF 1/4 W resistor	30470	1
1	R13	1k 5% CF 1/4 W resistor	29663	1
1	R17	680 5% CF 1/4 W resistor	31499	1
1	R18	470 5% CF 1/4 W resistor	31165	1
1	R19	15k 5% CF 1/4 W resistor	30146	1
<b>Optional</b>				
1	L1	Dual 8.2 mH common mode choke	18-129	5
1	Z1	8 VDC MOV	96891	1
<b>Wire-Wrap Items</b>				
1		Wire-wrap/unwrap stripper tool	276-1570A	7
1		AWG 30 Kynar wire-wrap wire (many colors)	22605	1
<b>Parts Vendor Key</b>				
1	Jameco Electronics, 1355 Shoreway Rd., Belmont CA 94002: 800-831-4242			
2	Mouser Electronics, 958 N. Main St., Mansfield TX 76063-4827: 800-346-4242			
3	Ten-Tec, Sevierville TN 37862			
4	Digi-Key Corp., 701 Brooks Ave. S., Thief River Falls MN 56701: 800-344-4539			
5	Hosfelt Electronics, 2700 Sunset Blvd., Steubenville OH 43952: 800-524-6464			
6	Far Circuits, 18N 640 Field Ct., Dundee IL 60118			
7	Radio Shack (local stores)			
8	Your choice			

**CORRECTION:** In Fig. 5 on page 13 of our May issue, pins 16 of U15-18 should go to +6V, not ground. Also, please note that PCBs may not be available for this project.

ensure a trouble-free end result. A scratch through one of the traces can give you pure hell. The PCBs are supplied with solder over tin plate.

When sockets or ICs are in place, check the voltage to each IC or socket. Next, insert resistor networks, DIP switches, discrete resistors, capacitors, and crystal. If the enclosure is prepared, insert the wall transformer wire through a grommet and attach to the PCB by soldering. Warning: Observe polarity. Mount the front panel switches and LEDs.

## Display assembly

Absolutely, use machine pin IC sockets with these expensive displays. When the wraps have been verified with sockets mounted, attach the 40-pin SIP interconnect. Insert the LSD digit ONLY! Power up and see if anything is working. You should get a visual indication on the display if everything is OK. Upon verification, remove the power and insert the other eight displays. Power up again to ensure that all nine digits look good.

Attach the RG-174/U coax input (50 MHz) to pin 4 of U-1 (CD-4536) and observe about 32768 on the displays. Almost always there is a number a little higher than 32768 Hz. This can be trimmed using the digital switches. Remember their weighted values when setting. There is approximately a 500:1 ratio between the PLL osc and the XTL frequencies. Adjust for 32768, which will ball park you to the correct settings.

Next, use the WWV 10 MHz to reference. A dummy load and transceiver with a digital readout as an RF signal source will get you very close. Usually the first bank of switches will tweak in the 10 MHz reference signal. Flick on the prescale (500 MHz) to test the 4-second time base and you should get the same reading as the direct shot. Direct is good to about 50 MHz (1 sec time base) and prescale is good to over 500 MHz (4 sec time base) (74LS00 = 35 MHz, 74ALS00 = 50 MHz).

As an optional item, and I think a very good investment, you can add a common mode line filter. The filter is designed so as to allow a low pass from



Header #1		Header #4	
R1	10k	Q1	MPF102
R2	15M	Q2	PN2369A
R3	22k	C21	0.1 $\mu$ F
R8	330	R17	680
C9	Jumper wire	R18	470
C5	220 pF NPO	R19	15k
C6	10 pF NPO	R15	220
X1	32768 Hz xtl	Plug (DIP16) ST Socket	
Header #2		C28	0.01 $\mu$ F
C13	Jumper wire	D5	1N4148
C10	0.001 $\mu$ F	D6	1N4148
C11	0.1 $\mu$ F	C29	0.01 $\mu$ F
R6	330k	AWG-22	Stranded black wire (interconnect) to Counter bd. [Note: Interconnect Counter bd. to Display bd. via SIP40]
R7	10k	WW Socket U-12	
R5	1M	Q3	PN5771
R20	10k	U12	CA-3199-E
R9	330	C27	220 pF NPO
		C19	0.01 $\mu$ F
		C34	47 $\mu$ F
Header #3			
U5	NEC PS2501-1	D1	1N4148
C33	0.01 $\mu$ F	D2	1N4148
C32	4.7 $\mu$ F tant	R14	1M
R13	1k	R16	4700

Notes: IC pins 9 & 10 have 0.1  $\mu$ F cap between pin 8 & 18. IC pins 8 & 9 have 0.1  $\mu$ F cap between pins 7 & 14. Use 18-pin DIP sockets for DIP16 ICs. Use 16-pin DIP sockets for DIP14 ICs. ICs U1 through U18 have 0.1  $\mu$ F caps Vdd to Vss. If sockets such as Hosfelt #21-338 are used, then C2-C23 can be eliminated, since the 0.1  $\mu$ F is manufactured integral to the socket.

Table 2. Header component locations.

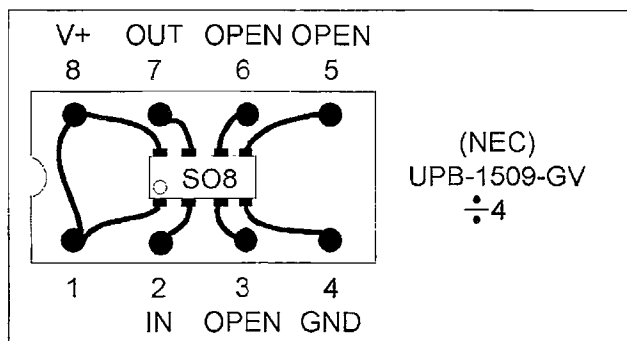


Fig. 7. Prescaler detail. I recommend using a machine in (ST) socket (DIP-8) as a carrier for SO-8 device. (1) Connect (solder) wire-wrap wire to each pin on the SO-8 device. (2) Glue SO-8 to socket. (3) Solder each wire to each pin on the (ST) socket. Note: As an alternative to the CA-3199-E (DIP-8) IC, use a machine pin DIP-8 solder tail IC socket for a header for the UPB-1509-GV IC. Glue a surface mount SO-8 to socket. Use wire-wrap and solder for connections.

400 kHz down to 1 Hz. This is a 35-cent device which blocks most of the digital noise from running through the wall converter on to the power lines. This filter is mounted to the enclosure cover using clear 100% silicone caulk. Wires are twisted and returned to the PCB for connection. Leave the lengths long enough to

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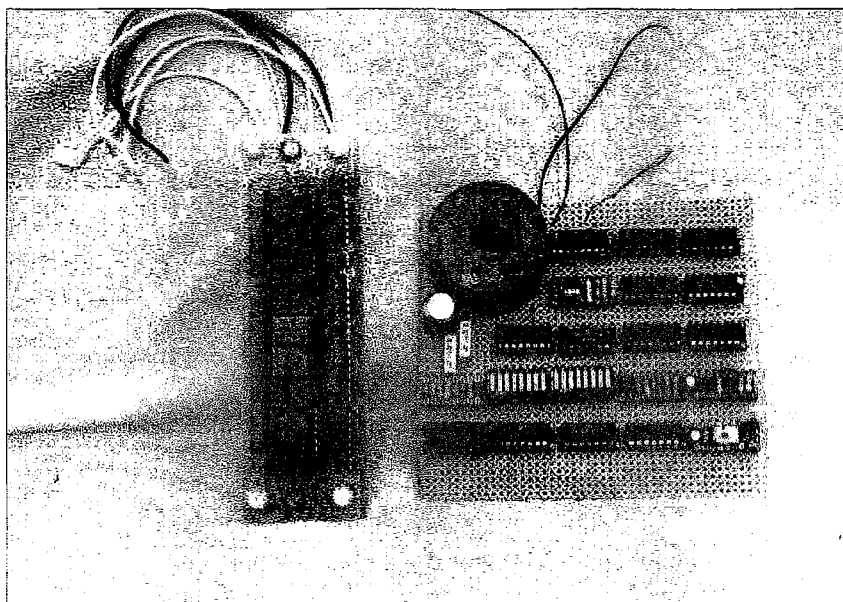
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*Photo C. Wire-wrapped main board.*

The time base stability is maintained because of the chronograph watch crystal being used which exhibits about  $\pm 25$ ppm over the specified temperature range. This crystal uses a tuning fork to achieve the subharmonic frequency of 32768 Hz. This frequency is then divided binarily by powers of two to get a one second (0.5 Hz) gate window. In watches the pulse is used to make a stepper motor move mechanical gearing. In our application the window opening is what we are interested in. The digital divide by N and DIP switches select the PLL multiplier frequency plus 512 and divides it for trimming the window. The  $2^{16} + 2^9$  equal a  $2^{25}$  overall ratio, which provides a pretty exact count period or gate.

The window opens for a 4 second period  $2^{18}$  0.125 Hz/50% duty cycle, which gives a 131,072:1 ratio between the crystal oscillator pulses and the divided 4 second pulse. The use of U-3 and U-4 provides a 512:1 multiplier function. That is, a  $2^9$  addition to the  $2^{16}$  thus giving us a  $2^{25}$  resolution. This results in approximately a 13,107,200:1 overall resolution. This is at least a  $\pm 1$  Hz resolution of the frequency being measured. That is really something at 150 MHz!

The effect of temperature has literally no effect on the gate window since the corrective PLL circuit tracks the 32768 Hz crystal tuning for frequency.

That is, they drift together! Equals divided by equals are still equal! Well, you get it! All the drifting, what little there would be over temperature, is nullified. The PLL VCO frequency runs at 16,777,216 MHz. My attempt to run it at 33 MHz resulted in PLL slew rate failures. That is, we reached the toggle limit of the PLL IC chip (74HC4046).

The use of standard multisourced 74HC devices was the best I could do. These devices are silicon gate CMOS logic devices which exhibit good noise immunity and low power, including a toggle speed of about 7 nS (40 MHz) and sometimes 60 MHz. The cellular telephone industry has provided us with some nice surface mount prescaler divide by N devices and at about \$2 each. These MMIC 2 GHz 50 mV prescale divide by 2,4,8 devices at two bucks each are just unbelievable.

Well, folks, we need to look at the new items which can move our hobby ahead. The influx of Japanese transceivers, and the don't-have-to-know-anything licensing program deterioration of our hobby, has not done a lot for us. So, let's get at it and update the technical end of the hobby so that these political misfortunes will not degrade our hobby any further. I plan on developing several lab-quality instruments so I can move on to some new areas of the hobby without having to spend a lifetime and a small fortune on instrumentation. 22

remove the enclosure cover. This filter keeps AC line noises from getting into the counter circuits also! The device is a dual 8.2 MH 5 amp 0.2 ohm AC filter choke made by Pulse Engineering as part number PE-96180, which is sold at 35 cents each from Hosfelt (part number 18-129).



# Temp-Controlled Solder Station

*Here's a simple project to improve your bench.*

*Don't I just "hate" that! You know, you're soldering (or desoldering parts), having the time of your life, and there's no place to put the hot pencil down. That little tin "thing" included with the pencil survived about one day, when it either collapsed from fear or ran away, never to return.*

I, for one, can't blame it much. I wouldn't want all that heat on my frail frame either! Now, I like using my RS "bulb squeezer desolderer," but I would like it better if it were a little more sophisticated.

"There has to be a better way," I mused. Chiding myself gently, I sighed and thought, "Well, ham, how are you going to solve this problem?"

Just a resting place for the hot pencil would suffice, but while you're building, why not make something just a little better? How about a holder, with a control device to regulate the heat and an indicator to tell me that I've left the iron on, and something that would look respectable besides.

"Whew, you don't want much," I mumbled to myself.

Scrounging around in the junk box, I came across the first thing to appear: the remains of the power supply from an old computer. A "snap-in" AC receptacle, a power cord (three-wire), a power switch, and one used chassis with cover (a hamfest "find" of last summer) also made their debut.

Now, I realize that my "junk box" is much deeper than most, and I suppose you'll have to go and buy some of the parts. I've included a shopping list to help you along (see **Table 1**).

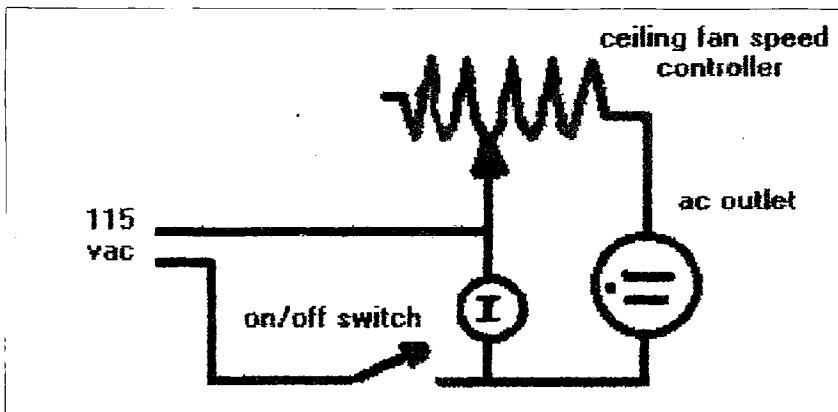
A short trip to the home improvement

store produced a ceiling fan controller and a package containing two 5/16" by 6" "eye bolts" with machine threads. The ceiling fan controller is nothing more than a variable resistor to dissipate power, thereby causing the fan motor to rotate slower. It also has an on/off switch built into it. We can use this to "cut back" on the amount of power supplied to the pencil, causing it to operate at a lower temperature.

The "eye bolts" required minor surgery to "fit" on my cabinet: I removed all but 1/2" of the threaded portion. The weight of the pencil is negligible, and the "eye bolts" will be used for a

Part	Part No.	Source
Metal cabinet	270-253	Radio Shack
Fan speed control	Home improvement center, \$8.00	
1/4" x 3" eye bolts	Home improvement center, \$1.80	
Neon indicator	272-710	Radio Shack
Power switch	275-1565	Radio Shack
AC outlet	161-0709	Mouser
Miscellaneous: AC cord with strain relief, nuts, screws, washers, paint, lettering — all as required.		

**Table 1.** Parts list.



**Fig. 1.** Heat controller circuit.



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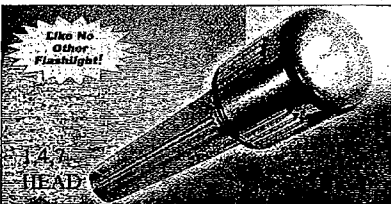
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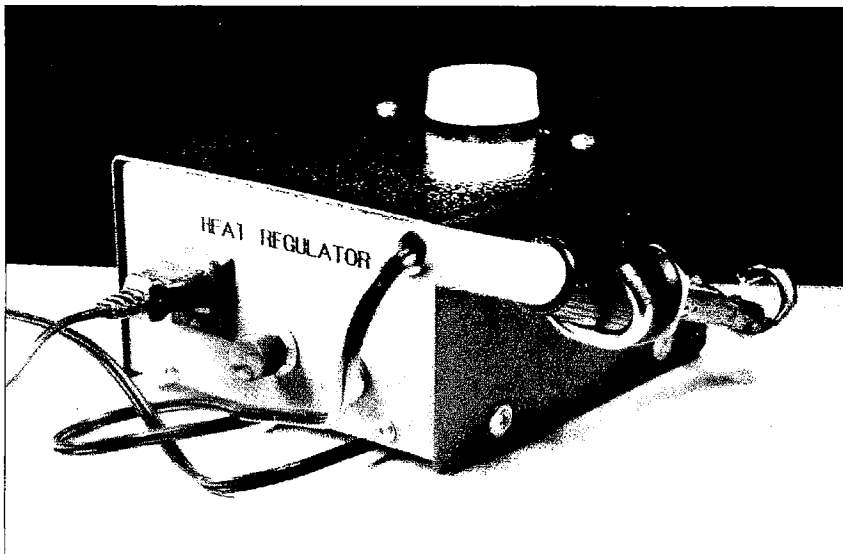
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**Photo A.** This attractive unit will control the heat to your soldering tool.

resting place for the heated pencil. Nuts and washers hold the "eye bolts" on the side of the cover. The "eye" portion of one bolt must be opened to form a cradle to hold the pencil handle. The other may have to be adjusted, depending upon your device to be stored. The "eye" was formed by a pressing device at the factory, so you'll probably experience some difficulty beginning to open the "eye." Once started, however, it gives up and submits to your desires. Be patient, be careful, and try not to damage either the threads or the finish on the "eye."

Wiring the device is as easy as it gets. (See Fig. 1.) The controller is basically a variable resistor placed

in-line with the heating element of the tool to control "how much" power is allowed to reach the tool. The indicator, while not totally necessary, stops me from leaving the unit on when it is no longer being used.

I placed my controller on the top cover by cutting an oversized hole to accommodate the securing nut on the shaft. The entire assembly is attached to the cover with nuts, bolts, and washers. The square hole for the AC receptacle was cut to size, and a hole for the power indicator drilled alongside. While doing the metal work, the hole for the on/off switch was drilled to size. The controller switch could have been used. Using an additional switch allows me to leave the controller "set" and not require readjustment each time the unit is turned on (see **Photo A**).

The completed project meets all the requirements. It's functional, inexpensive, and easy to build. Finishing paint and labeling is your choice. I used "adhesive-backed shelf paper" to cover the front panel and paint on the cover. It matches the other devices I've built, but the choice of finish is entirely yours. This project will live on your bench and become an integral part of your building adventures. Devices such as this are some of the basic "needs" of the home builder.

- Lasts 4 times longer than regular flashlights
- Lifetime warranty including LED lights
- Shockproof
- Features 4 high intensity LED lights
- Powered by 3 AA alkaline batteries

After continuously being turned on for 14 days (336 hours), it was possible to read a newspaper using only the output from this amazing system. This item sold out at Dayton!



# Restoring an HQ-140-X — Part II

*This Hammarlund rig has always been a favorite.*

*Part I of this series focused on the condition, both electrical as well as physical, of my Hammarlund HQ-140-X receiver. Once it was determined that the receiver had no major electronic faults, power was left on and a series of diagnostic tests were performed to ascertain the health of the receiver. Since my HQ-140-X appeared to be functional per the original design intent, a clean-up and restoration process was then laid out.*

All my HQ-140-X really needed was a very good “bath” and mechanical parts lubrication. Of course, it isn’t a good idea to immerse a receiver in a tub of water, though my receiver certainly deserved it because of the dirt and filth that it exhibited (see “before” photos A and B).

The filth on the panel appeared to be the color of nicotine-stained dirt enhanced with perspiration, all caked on during many years of use. The filth was really very difficult to remove, but patience paid off as the brush and

detergent worked through the grime to remove it without marring the painted surface. To accomplish the cleaning, I used a toothbrush, dish detergent, and water to scrub the panel and knobs. Here is the procedure that I used, with cautions noted:

- DO NOT press against the meter glass.
- DO NOT use a solvent as a cleaner, as it could soften, bleach, or stain the painted surface.
- Clean using only a mixture of dish detergent and water.

- Using the mixture, scrub with a toothbrush.

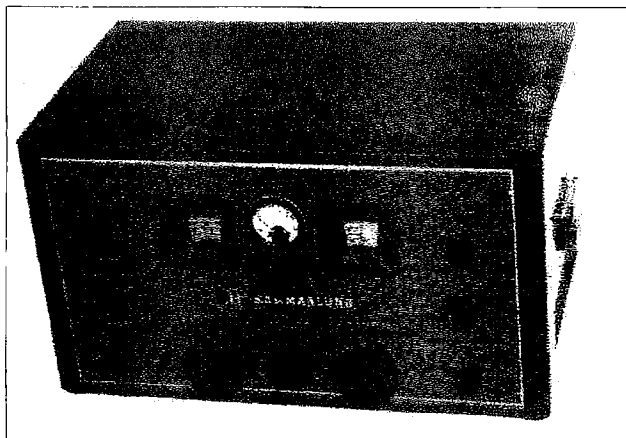
- Wipe with a paper towel before the mixture dries.

- Repeat the above cleaning steps until satisfied that all of the dirt is removed.

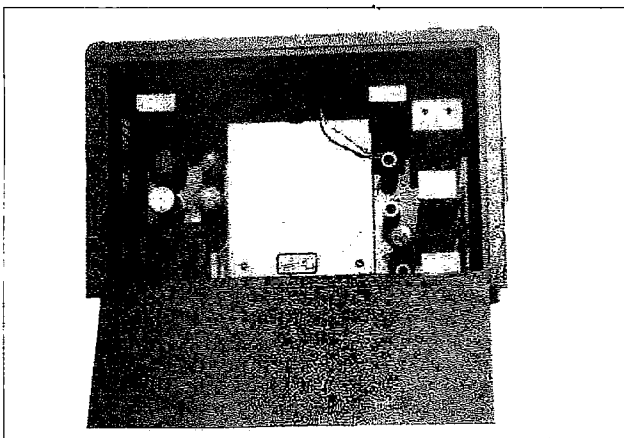
- Be patient.

- Apply Johnson’s Pledge to the panel. Polish with a soft cloth.

After getting all of the dirt removed, the panel was waxed. Waxing of the painted panel was accomplished by spraying it with Johnson’s Pledge, and

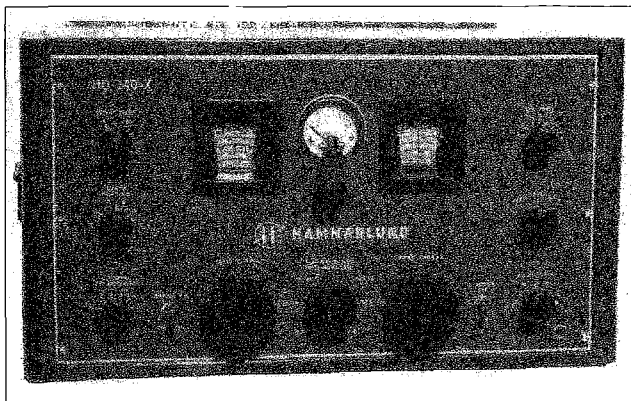


**Photo A.** The receiver as it was removed from storage. Note the dirt on the cover and the dark stains around the knobs.



**Photo B.** This view shows the dirty interior of the receiver after removal from storage.



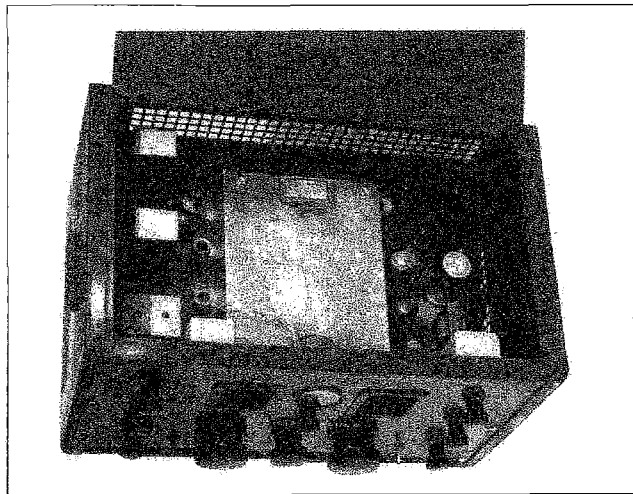


*Photo C. The front panel after it was cleaned and waxed.*

then wiping it down with a soft cloth until it "glowed."

Cleaning of the cabinet was much easier than the panel because it did not contain any electronics. The cabinet of my HQ-140-X has a gray hammertone finish, not a black wrinkle as was used on some receiver cabinets. Although my cabinet finish shows some minor scratches, it is otherwise in pretty good shape. Here is the procedure for cleaning the painted cabinet:

- Use a stiff-bristle fiber or paint brush.
- Use a mixture of dish detergent and water.
- Apply the mixture to all surfaces of the cabinet.
- Scrub the dirt inside and out of the cabinet.
- DO NOT allow the detergent to dry on the paint.
- Wash/rinse with large amounts of water while scrubbing with a brush.



*Photo D. This is how the internal chassis looked after it was scrubbed clean with a stiff-bristled fiber brush.*

• Dry the cabinet with towels to remove all excess water.

• Dry the cabinet in the sunlight to remove trapped water.

• Inspect the cabinet for any remaining dirt; repeat the cleaning process as necessary.

• Use automobile finish wax or

Johnson's Pledge on the painted surfaces.

• Polish the surface with a soft cloth.

Note: If using automobile wax, a white residue will build up in scratches and crevices. Remove the residue by wiping with a dry toothbrush.

I soaped up the entire cabinet, inside and out, to loosen and remove as much dirt and grime as possible. A garden hose was used to flush away the soap and debris. The cabinet was then dried with a towel and placed in the warm sun to evaporate any trapped water.

After the cabinet was dried, a small amount of automobile car polish was used to lightly clean up the finish because some stains appeared on the surface that were not removable with soap and water. Hammertone paint can show up attempts to clean with an abrasive polish, including automobile polish, so care must be taken to use the

cleaner only to remove the majority of caked-on dirt, oxides and stains, but not to remove the surface of the paint. Once the cabinet finish is clean, it can be waxed using either an automotive finish wax, or Johnson's Pledge.

The "after" photos, C and D, show the appearance of my receiver after the

process was completed. The front panel view of my HQ-140-X looks like a "new" receiver, just in case the photos fail to show it that way. Unfortunately, a few scratches on the cabinet top cover and the chassis give away the secret.

### Internal cleaning

Up until this point only the exterior surfaces have been discussed. **Photos E, F, and G** show the internal condition with **Photo E** showing the greatest amount of dirt buildup. Fortunately, the underside of the chassis was protected by the cabinet, so that dirt and debris was not evident.

Cleaning of the chassis was more difficult than the panel or cabinet because it was desired to not get the cad-plated chassis wet, which might allow it to corrode or rust in the future. After deliberation, I elected to use a stiff-bristled fiber brush to mechanically remove the bulk of the dirt. Continued brushing, with a lot of patience, removed the majority of the dirt accumulation improving the appearance of the chassis. Brushing of the painted on tube nomenclature was avoided, as it would have removed the marking.

One of the advantages of using the fiber bristle is that it does not leave scratches in the cad plating of the chassis. Marking or scratching of the chassis could reduce the potential market or museum value, and that was to be avoided even though I intend to retain the receiver.

Removing dirt and grime improves the appearance of the receiver, but does little regarding its performance. During the initial evaluation, it was noted that noisy pots, the ganged tuning capacitor, and switches required attention to clean them up.

Two steps were taken to improve their operation. (Note: A TV tuner cleaner was selected for use because it DOES NOT CONTAIN an oil or solvent that could permanently damage the pots or switch wafers. Also, it does not contain a conductive material that would change the conductivity of the switch wafers.)

(1) The aerosol TV tuner cleaner was used by spraying it into the pot



openings with the objective of cleaning the resistor card within. The pot shafts were rotated as the cleaner was injected. The cleaner was also injected into the shaft/bushing to loosen up the mechanical operation.

Cleaning of the bandswitch followed a similar procedure where the contacts were sprayed judiciously with the cleaner. An excessive amount of cleaner would have overly wet the switch wafers, requiring a lengthy period of time for them to dry.

(2) Lubrication of the tuning capacitor shaft was required to eliminate the "drag" that appeared due to a lack of lubrication during the many years of use. Oil was also applied to the antibacklash gears to free them from friction.

A small amount of light motor oil was carried with a thin shaft screwdriver to each of the shaft bearings. At most, only a drop of oil was required, and any excess was removed with a paper tissue. The capacitor shaft was rotated as the oil was being applied with the objective of working the oil onto the bearing surface. Also, the detent ball bearings in the band switch assembly were lubed using drops of motor oil applied with the thin screwdriver shaft.

## Operation

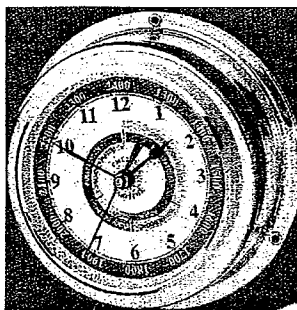
Because most of the present low band operation is with single sideband, and with the HQ-140-X having only an AM detector, an operating technique was needed to demodulate SSB signals. After playing with the receiver's controls, the following technique was found to make it perform in a manner as if the receiver had a product detector.

- Set the AUDIO GAIN control to max.
- Reduce the SENSITIVITY control slightly.
- BFO selected.
- Set the CW TONE control to "-2".

Dial in an SSB station and adjust the fine tuning for best clarity of the signal. Adjust the SENSITIVITY control for the desired volume. With the sensitivity setting at MAXIMUM, the signal WILL NOT demodulate correctly, but the signal clarity will improve as the control setting is reduced.

With a station tuned in, the CW Tone control may be used as a signal clarifier by rocking it back and forth slightly — or the fine-tuning control may be adjusted. Regardless of whether listening to LSB or USB, leaving the BFO at "-2" seems to work well.

*Continued on  
page 30*



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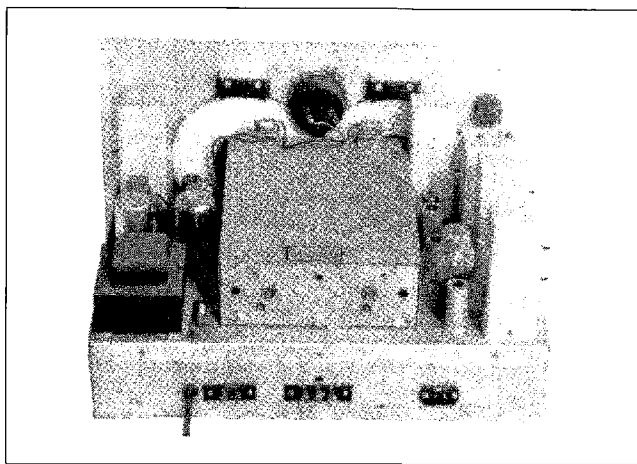
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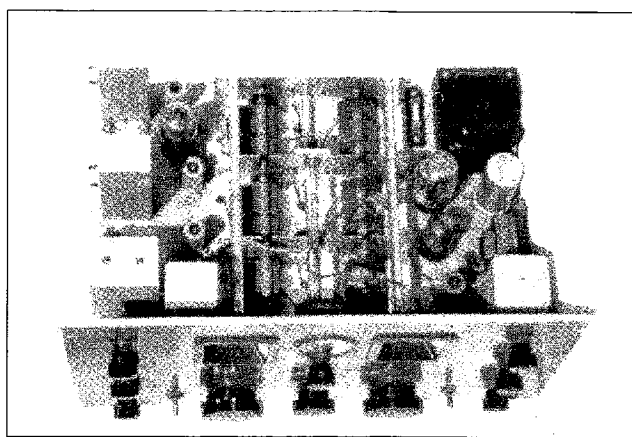


**Photo E.** This photo shows the chassis outside of the cabinet before it was cleaned.

## Restoring an HQ-140-X — Part II

*continued from page 29*

Another observation that I made was with the use of the crystal filter. There wasn't any significant QRM during my test period, should it be a factor, but I did select and adjust the crystal filter to see how effective that it might be. In the narrowest setting, "5", the bandwidth appeared



**Photo F.** The tuning capacitor cover was removed prior to cleaning the chassis. After cleaning, the capacitor shaft bearings were lubricated before the cover was replaced.

to be less than 2 kHz and wasn't really suitable for phone reception, but appeared to be excellent for CW. Crystal switch settings at positions "1" and "2" appeared to be adequate for SSB operation where an estimated bandwidth of 4–6 kHz was achieved. An adjustment of the CRYSTAL PHASING control provided an excellent means for separating adjacent stations.

## Conclusions

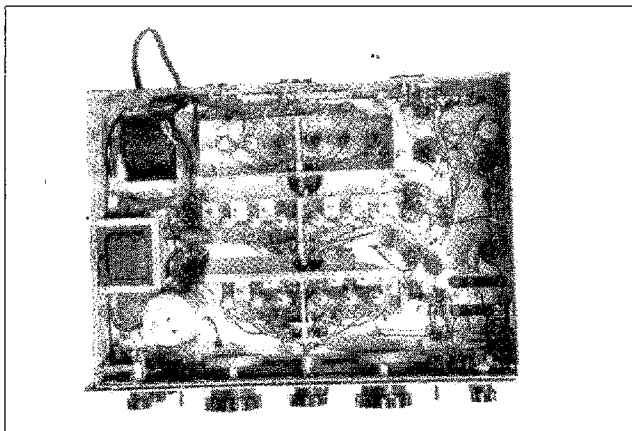
Before wrapping up the receiver project, I tried it on several antennas to see how it might compare relative to the antenna type and to a solid-state radio that resides on my bench. The measure that I used for this test was to see if the receiver would hear the same DX stations as the solid-state radio. Was I surprised when one of the first stations that I heard on the HQ-140-X was an OZ9 (Denmark) station swinging the meter to an S9 (BFO off). Upon tuning around

*Continued on page 56*

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**Photo G.** This is a view of the underside of the chassis. Being enclosed within the cabinet, no dirt was detected. Cleaning of switch contacts and oiling of the switch bearings was performed prior to installing the chassis back into the cabinet.



# Travels with Henryk — Part 5

*The niceties of Norway.*

*During the past twenty years, the number of amateur radio operators in Norway has greatly increased since the country struck it rich with offshore oil. Thankfully, though, people have not become spoiled by this upswing in the economy, and they are still friendly and hard working. They do seem a little bit shy and withdrawn, which is something I noticed while traveling through this long and narrow country of Scandinavia.*

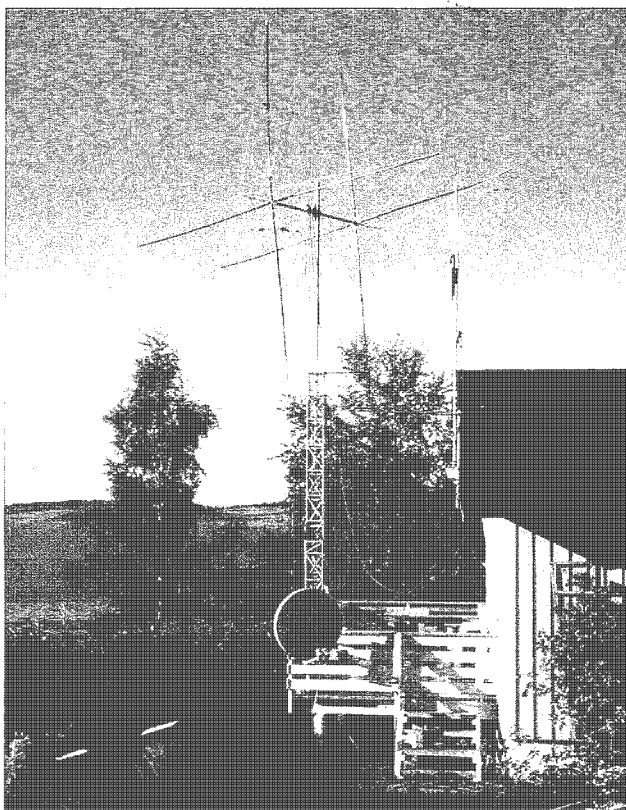


**Photo A.** Visitor/operator LA2CKA enjoys using special station LG5LG in Morokulien, Norway.



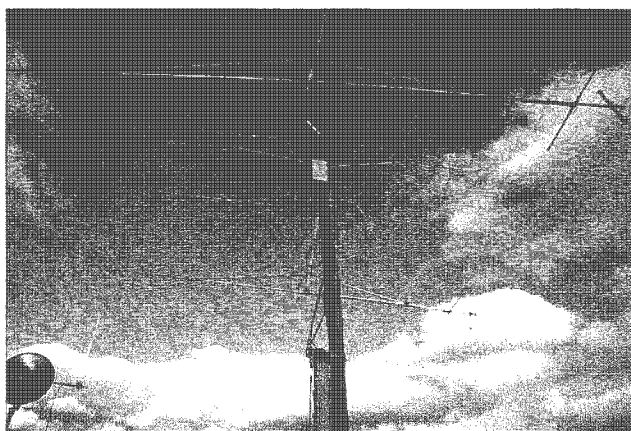
**Photo B.** Svein Arne LA3SEA, a volunteer working for ARIM, enjoys operating this club station in Morokulien.

**T**he most spectacular entry point from Sweden is the border crossing in Morokulien. This place was created to support peace efforts by Swedes and Norwegians.



**Photo C.** Eat your heart out! This ham shack near a lake in Skogn has its antennas on an attached deck.





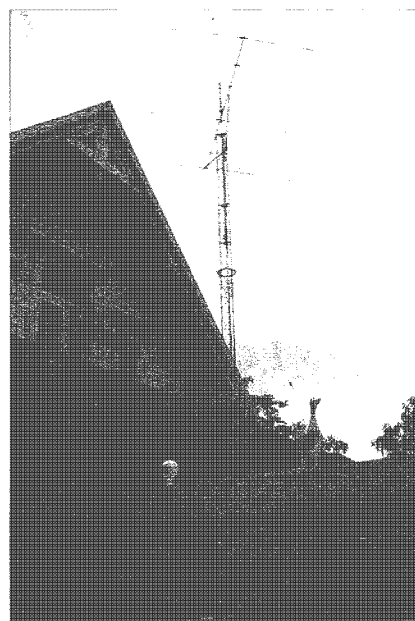
**Photo D.** This VHF/UHF antenna belongs to the LA1K ARC in Trondheim.

One of its highlights is an amateur radio club station shared by hams of the two countries. There is a spacious radio shack (**Photo A**) and regular living quarters — all is for rent — and hundreds of visitors from all over the world have been here and operated

I drove farther north. Using 2m FM radio I was trying to get in touch with local hams, but very seldom would anyone respond to my calls.

In the small village of Skogn I spotted a nice cubical quad antenna (**Photo C**) and a few other HF and VHF antennas.

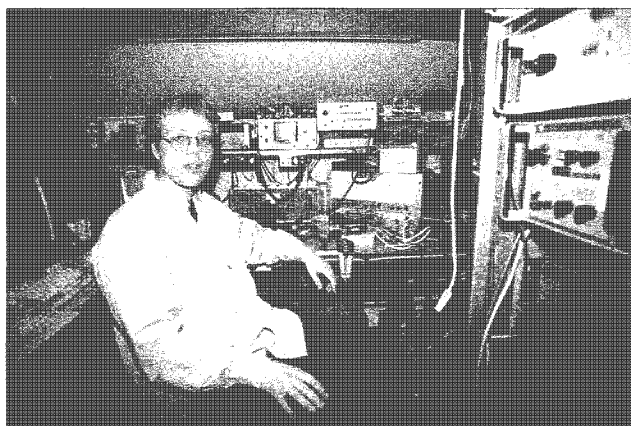
radio using one of the two callsigns: LG5LG and SJ9WL. This club station is supervised by a joint-group called ARIM. One of the volunteers working for it is Svein Arne LA3SEA (**Photo B**). The cottage is actually on the Norwegian side of the border, but the 75m dipole hangs in Sweden, they say.



**Photo G.** Esgil LA9MB erected this HF array in Trondheim.

stream of students who join them and really get engaged in club activities. Some remain members of the club even after finishing their studies, like Espen LA6MGA (**Photo F**). There are a few operating positions for HF and VHF, well-equipped shop and test lab, a library and a bar.

*Continued on page 56*



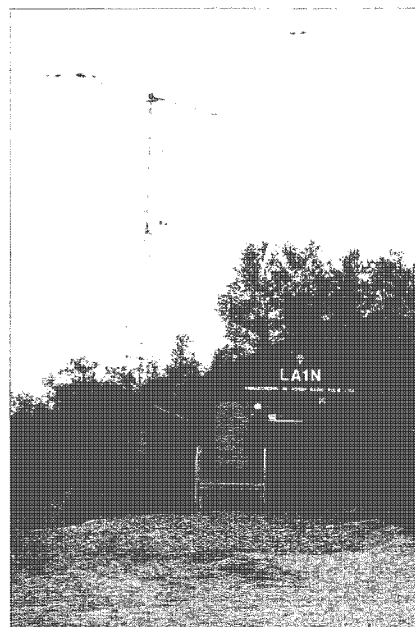
**Photo E.** Martin LA3JJA operates at the LA1K ARC club station.



**Photo F.** Espen LA6MGA remained a member of the LA1K ARC even after graduating from the technical school.

But nobody was at home, so I still don't know to whom they belonged.

In Trondheim, a significant and ancient city, I saw some amateur radio antennas from the main road (**Photo D**). This turned out to be the local technical college campus, and the antennas were part of the versatile amateur radio club LA1K. Martin LA3JJA (**Photo E**) happened to be near and helped me to see the club from inside and meet a few other members. This is one of the oldest and most prolific clubs in Norway, but on the other hand, they have a steady



**Photo H.** The local amateur radio club (LA1N) in Narvik operates from this attractive location.



# Glow, Little Glo-Bar

*We bet THIS gets you thinking.*

*This is a quick weekend project — a remotely located high-power RF dummy load. It can handle a 1 kW CW carrier for about 30 seconds at a time. It is designed for the terminating end of a coax run and can be used as a dummy load or a dummy antenna.*

How many times have you wondered what amount of RF was getting to the antenna system? Well, if a dummy load were at the end of that coax line, you could see how the SWR was, which would give you a good idea of how much is getting to your antenna system. When the dummy load is switch-selected, or manually connected to the end of the coax line, the power output or SWR will give you a good comparison reference. It is also a good test for the condition of the coax and connectors.

The inexpensive remote dummy load shown here can do the job quite nicely and at a cost of under ten dollars. The home-brew of such items is still possible without needing a bank loan to pay for them! I have noted in the last twenty years an increase of about 500% in the cost of a commercial type of load, which is due largely to governmental regulations and the cost of doing business.

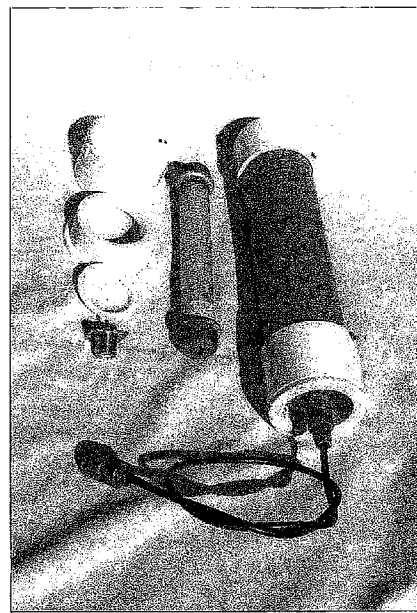
So, we take a trip to a couple of the summertime hamfests and browse a bit to locate what are called a noninductive "Glass" Glo-Bar (Sprague Electric Co.) power resistor. Usually these are in the 75-ohm area, but sometimes there are 40- and 50-ohm types available.

The Sprague Company rated these bar resistors at 600 watts DC power in the old days. Do not be confused with the wire dual-winding types that some of the companies call "noninductive." Those are not noninductive types!

Noninductive resistors are milk white in color and have large, silver-plated end caps on them. See **Photo A** to get an idea of what one of these guys looks like. These resistors usually sell for from fifty cents to a dollar each at the flea market.

Now that you own one, let us see how to construct a high-power HF RF dummy load. These loads can take 1 kW CW for about 30 seconds at a couple-minute intervals with no problem. Getting wire connections to these end caps is the next trick. If you are lucky, your find might just have the original snap-on clamps that have lug screws to make things easy for you. In most cases, they do not come with those convenient attachments. So, we now procure a couple of stainless steel automotive hose clamps to do the job of making a tight wire-to-end-cap connection. I do not recommend trying to solder to the end caps, since the resistor element inside the glass enclosure may disconnect.

Now that you have a couple of AWG-12 wires connected using hose clamps, you are ready to do the physical mounting of the resistor inside of the two-inch PVC pipe. This may try your patience a bit! I used a couple of stainless steel screws, nuts, and lock washers to do the mounting. Just drill holes in the pipe and mount them. The PVC pipe is a good insulator and



**Photo A.** Dummy load component parts.



Qty.	Item	Cost
12 in.	3 in. gray PVC pipe	\$ .30
1	2 in. PVC cap	\$1.00
1	2 in. PVC coupling	\$ .30
1	2 in. x 1.5 in. PVC reducer	\$ .60
1	1.5 in. test plug	\$ .10
1	SO-239 coax receptacle	\$1.00
4	SS #6-32 screws, nuts, washers	\$1.00
2 ft.	Stranded AWG-12 (14 OK) wire	\$ .20
4	SS #4 sheet metal screws	\$ .20
2	SS 1 in. automotive hose clamps	\$1.00
2	SS #10-1 screws, nuts, washers	\$1.00
1	75 ohm (50 ohm) Glo-Bar glass resistor	\$1.00

Note: NIBCO brand DWV PVC fittings are recommended.

**Table 1.** List of materials.

works just fine. Now feed the two wires to one end of the pipe so they can be attached to the SO-239 coax connector.

The SO-239 is mounted to the two-inch test plug using stainless steel screws, nuts, and washers. It is placed in the 2" x 1.5" PVC reducer fitting using a little clear 100% silicone caulk. Allow the caulk to dry overnight to be sure there will be no leaks. It is not necessary, but I mixed up a little automotive epoxy made by Permatex Corporation that is used in automotive body repair. It is a clear material and pours into the cavity to make sure there is a waterproofed connector. I also drill a few holes around the rim of the PVC reducer so the epoxy has a good grip on things. Make sure you put the two-inch PVC coupling over the wires before attaching to the SO-239 assembly.

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Now comes the sealing part of the assembly. Make sure you have a couple of stainless steel bolts, 0.25" x 2", attached to the pipe so that attachment to a tower leg is possible. I use the common NEC-approved ground clamp to attach the assembly to my tower leg. When you slip-fit all of this PVC stuff together and it fits OK, the next move is to either glue or screw the parts together. I use #4 x 0.5" stainless steel sheet metal screws to complete my permanent attachment.

If I ever want to go back into the assembly, it is not a problem. If you use glue to do this — you have a problem! I use a one-sixteenth drill bit to make a vent hole on the top cap and several along the side of the pipe to provide a breathing system for the resistor. Any condensation from heat expansion can ventilate out of these holes. Do not make them bigger or you will provide a nice home for some of those bad insects!

Remember, those screws holding the resistor are RF hot and should not come in contact with anything! I usually put a dab of clear 100% silicone caulk over them just to make sure.

Now comes your test. Put the dummy load at the end of your coax feedline and fire up the rig to see what kind of SWR you come up with. Start with 10 watts output. Move up to 100 watts when you feel comfortable, and if the SWR is less than 2:1. You should be able to tune out the reactance with your tuner without any problem. Use 80 meters to make things easy on yourself! If you are using a 75-ohm resistor and 75-ohm coax as I do, then a 1:1 SWR should be present and your whole 100 watts will go out to the dummy load. If you are using 50-ohm coax and a 75-ohm resistor, then a 1.5:1 SWR would be present. No big problem figuring this out, you say. Yes, you are right, so do not pass up a chance to purchase a 75-ohm resistor just because you are using 50-ohm coax. You are smart enough to figure the mismatch between the two impedances, so 1.5:1 is really a 1:1 SWR with good coax and connectors.

Now, just a couple of words to those hams who are biting at the bit because I did not include the 145 and 440 MHz

gang. You are usually operating under 100 watts in the range. Mouser Electronics and Digi-Key Electronics both sell what we call MOF resistors. These are metal oxide film types, i.e., really noninductive types. If several of these are connected together in parallel, a 100-watt dummy load can be made for VHF/UHF use. They are in 5-watt sizes in the less than fifty cents price range. Capacitive and inductive reactances are really present in these frequency ranges, so you will have to carefully consider this when designing. Nothing to be afraid of — just be aware. About ten of these 5-watt resistors should do the job for you. A 30-second 100-watt rating is probably OK. You can stick the assembly into a glass jar full of mineral oil and take the power on up if you like. Just be a little creative!

As I have always mentioned, the best SWR match is when using an odd multiple of electrical one-half wavelengths of coax cable. You must figure the velocity factor to get the electrical wavelength correct — just look it up in an ARRL handbook for the coax you are using. If the SWR is up because of some odd length of coax, then you will have heating and high voltage breakdown problems, not to mention possible TVI or RFI.

When matched properly, most of your RF will now get to your antenna system if the impedance of the driven element has a reactive resistance somewhere between 50 and 75 ohms. If it does not, then a balun, gamma match, T-section, or some other form of RF transformer must be used to get the antenna driven element to match the coax impedance. All matching devices have losses, so try to avoid them if possible!

A final note. You must ground your outer shield of the coax-to-earth ground at the base of the tower preferably, both to ensure safety and to keep RF from running up the outside of the coax — TVI, RFI, and a lot of bad things. It is the FCC's rule that *RF and DC electrical earth ground must be used*. It also makes the antenna system efficient, which gives you the performance you are looking for. Good shopping! 73, Carl Markle K8IHQ.



# Icom Interface, Texas-Style

*This mod for 706/706MKII owners has concepts everybody can use.*

*Since I have been operating the digital modes, it has been like a breath of fresh air. I say that because I have been a dedicated CW buff, and it has finally taken a toll on my operating. One of the reasons is that I finally sold my home and moved into a retirement condo. Needless to say, no outdoor antennas allowed.*

With this being the final word, I picked my apartment on the 3rd floor, hoping I would have access to the attic. Yep, that's what happened. Had a nice spacious attic above my apartment. Since I am 82 years old, I didn't know if I could maneuver on the studs, so I decided to get my son-in-law to do it for me. On my instructions, he installed a 70 ft. horizontal loop fed with 450 ohm ladderline. With the aid of an outboard tuner, it worked exceedingly well on 20 through 10.

However, this is where the digital modes came in handy. This being an extremely large condominium, they have 271 apartments. Everybody has one or more TV sets, fax machines, DVD players, and the like — and a lot of the old folks had pacemakers, too. Also, the apartments had electronic emergency phones, fire alarm systems, and security devices. Running 100 watts would activate some of these. Now came the digital modes. By using PSK, I was able to run 10 watts and no more than 35 watts — I was able to enjoy ham radio once again. I made many contacts and worked quite a few countries. I also decided to explore some of

the other digital modes, so I downloaded programs that would work with my soundcard: RTTY, MFSK, Hellschreiber, MT63, and SSTV. They

are all excellent programs and perform well.

*Continued on page 56*

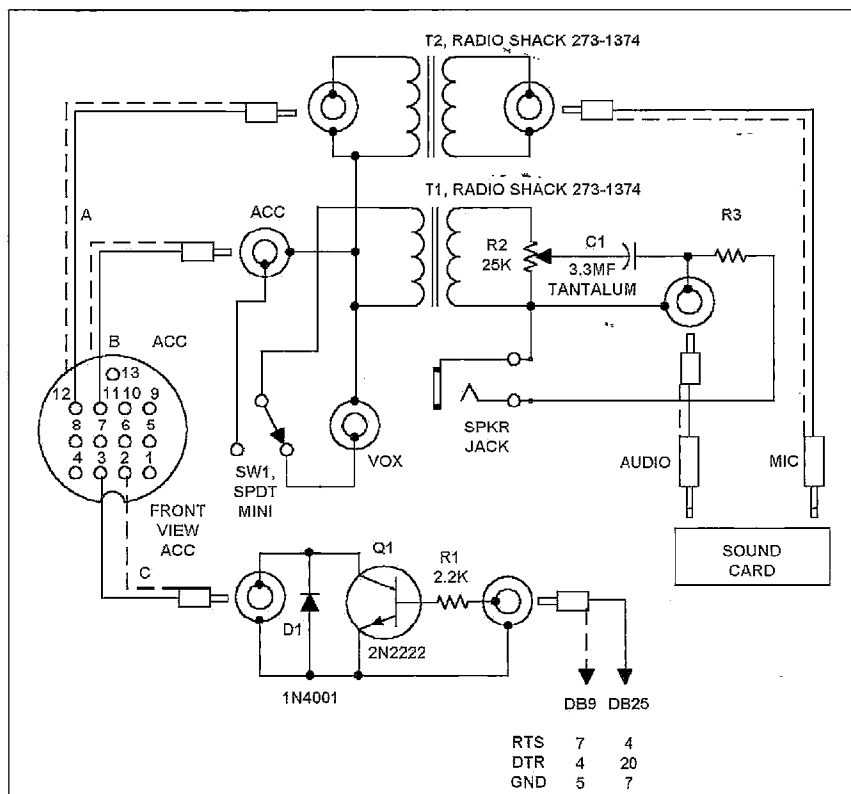


Fig. 1. Icom 706/706MKII interface circuit. R3 is 5k.



# Windowsill Mount for Verticals

*For when you're not flying the flag.*

*Here is an idea for a windowsill mount for "Ye Olde Fishing Pole" antenna in the December 2001 issue. It should provide a reliable window mount for most antennas that would be used from an apartment where you have no other recourse in getting an antenna up for amateur radio applications.*

I first used this type of windowsill mount when I moved to an apartment back in Brooklyn NY in the late 1950s. If constructed correctly, it should provide you with years of good service. In those days, I used a 16-foot-long tapered aluminum pole for 20 meters, and it withstood a multitude of abuse, including removing, replacing, and high winds.

You can use this type of mount for most any type of antenna that would be employed outside your window, and with a variety of tuning apparatuses that can be mounted on the inside of the mounting board.

For twenty meters I had a large

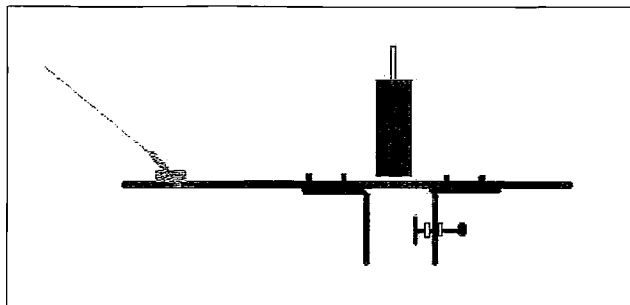
inductor and variable capacitor mounted on the inside of the board. This inductor had a multitude of taps to employ, and was configured so that parallel and series tuning could be used by moving a variety of board-mounted clips.

I don't provide any specific measurements here as to screw, bolt, or angle bracket sizes — this will all depend on what you have in mind; the size and width of the particular windowsill that you will be using; and also what kind of pole that you may use for an antenna. You may have in mind many applications,

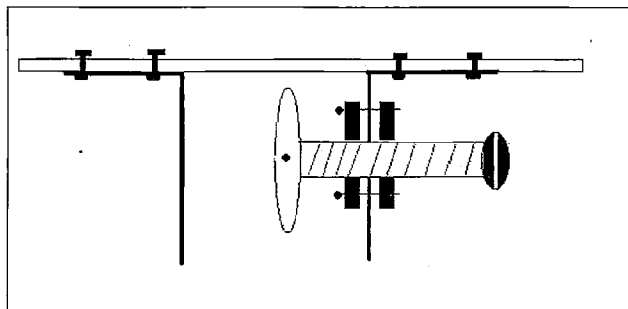
depending on what available stock that you have on hand. My main intention is to provide you with an avenue in which to get an antenna outside. You even may elect to mount a small commercial antenna tuner on the apartment side of the board.

I would in most cases use for the board a phenolic material at least one inch in thickness. Wood could be employed, but I would recommend providing it with a good coat of varnish

*Continued on page 57*



**Fig. 1.** Board lies across inside and outside sills, underneath window itself. Author used a Walmart balcony flag mount with a clamp to hold the antenna.



**Fig. 2.** Screw-type tensioner has round pressure plate at end, under which a small piece of scrap plywood or similar material can be placed to protect surface of inner wall. Screw is turned through nuts fixed onto inner L-bracket, pushing pressure plate against inner wall and securing assembly by pulling outer L-bracket against outer wall.



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the September issue, we should receive it by June 30. Provide a clear, concise summary of the essential details about your Calendar Event.*

## JUNE 1

**WASHINGTON TOWNSHIP, NJ** The Bergen ARA will sponsor its Annual Spring Hamfest on Saturday, June 1st, at the Westwood Regional Jr./Sr. High School, 701 Ridgewood Rd., Washington Township NJ, approximately 15 minutes from the GW Bridge and 5 minutes from Paramus NJ. Vendors arrive at 6 a.m. General admission 8 a.m.-2 p.m. VE exams 8 a.m.-10 a.m. only. DXCC card checking. Rain or shine. Indoor and outdoor spaces. Lots of parking for tailgating. Admission is \$5 donation (non-ham family members free), and vendors \$10 per space. Restroom facilities and refreshments available. For more info check the BARA Web site at [[www.bara.org](http://www.bara.org)] or contact Jim Joyce K2ZO at [[K2ZO@arrl.net](mailto:K2ZO@arrl.net)] or phone 201-664-6725. Talk-in on 146.19/.79.

## JUNE 9

**WHEATON, IL** The Six Meter Club of Chicago, Inc., will present their 45th annual ARRL sponsored ham radio and electronic flea market Hamfest at the DuPage County Fairgrounds, 2015 Manchester Rd. (North of Roosevelt Rd. (Rte. 38), east of County Farm Rd.). This is an all-weather hamfest with 3 buildings and a large outdoor flea market. Features include ARRL and dealer displays, food and refreshments, free parking — no extra charge for space in the outdoor flea market, limited overnight RV parking with electrical hookup, \$15 each space — advance registration required. Advance tickets \$5, \$6 at the gate. Advance tickets available from Six Meter Club of Chicago, 2335 South 2nd Ave., North Riverside IL 60546, or from any club member. Payments for registrations must be received with an SASE no later than May 25th. Commercial 8-ft. tables with 110V in the air conditioned main building, \$15 each. Indoor flea market tables, 8-ft. with no electric, \$12 each. For info call the 24-hour InfoLine at 708-442-4961. General parking is at the west gate. Sellers only at the east gate. For handicap parking use the east gate. Gates open at 7 a.m. Buildings open to the public at 8 a.m. Talk-in on K9ONA 146.52, K9ONA/R 146.37/.97 (107.2). VE exams 9 a.m.-11 a.m. Call the InfoLine to pre-register for exams. Please note: Absolutely no alcoholic beverages permitted. All sellers are responsible for cleanup of their spaces.

## JUNE 15

**DUNELLEN, NJ** The Raritan Valley Radio Club's "Hamfest '99" will be held at Columbia Park, near the intersection of Routes 529 and 28. Sellers set up at 6 a.m. Buyers admitted 7 a.m.-2 p.m. Admission: Buyers \$5, sellers \$10 with \$5 for each additional space. Talk-in on 146.625 R, 447.250 R tone 141.3, 146.520 simplex. Contact Doug Benner W2NJH, 732-469-9009, E-mail [[WB2NJH@AOL.COM](mailto:WB2NJH@AOL.COM)]; or Fred Werner KB2HZO, 732-968-7789 before 8 p.m.

## JUNE 16

**MONROE, MI** The Monroe County Radio Communications Assn. will hold its annual "Monroe Hamfest" 7:30 a.m.-1 p.m., at the Monroe County Fairgrounds, 2 miles west of Monroe on M-50. Indoor tables \$12 for each 8 ft. table. Trunk sales \$6 per 8 ft. space. Overnight camping \$15. Free parking, refreshments available. Talk-in on 146.72. Admission \$6 in advance, includes two stubs for drawing; \$6 at the door with one stub. Contact Fred VanDaele KA8EBI, 4 Carl Dr., Monroe MI 48162. Phone 734-242-9487 after 5 p.m., or E-mail at [[ka8ebi@arrl.net](mailto:ka8ebi@arrl.net)]. Reserve tables online at [[mcrca.org/hamfest.htm](http://mcrca.org/hamfest.htm)].

## JUNE 22

**HASTINGS, MI** Come to the Barry ARA Field Day Ham Radio and Computer Swap, June 22nd, 8 a.m. to Noon. The location is Charlton Park, 2545 S. Charlton Park Rd., Hastings MI. M79 east of Hastings, west of Nashville MI turn north on Charlton Park Rd. Admission Free. Trunk sales \$5 per space and indoor vendor's tables \$10 each, paid before June 1st. E-mail to [[K8YPW@ARRL.NET](mailto:K8YPW@ARRL.NET)] or write to K8YPW, P.O. Box 370, Hastings MI 49058. Talk-in on 146.46 FM. Setup at 7 a.m. VE exams 1 p.m. to 3 p.m. Advance reservations available until June 1st. Contact N8ZSG at [[peted@msgexp.net](mailto:peted@msgexp.net)]. There will be family activities going on at the Historic Charlton Park Village. Free. Beach \$5 per auto. Food vendors will be on the scene.

## JUNE 23

**EASTON, MD** An Eastern Shore Hamfest sponsored by the Easton ARS will be presented Sunday, June 23rd, at the Talbot County Community Center at Mile Marker 61

on US Rt. 50, north of Easton. Field Day will be in progress. Those attending the hamfest are cordially invited to visit and participate in Field Day. General admission is \$5 per person at the gate, no advance sale. This event will take place 8 a.m. to 4 p.m. Indoor exhibitor space includes chairs and electricity for \$10 per 8 ft. table. Tailgating \$5 per space plus admission. Free parking and lots of space. Setup will open at 6 a.m. Contact Tinsley Meekins K3RUQ at 410-770-3715, or see the Club Web site at [<http://www.ajfox.com/ears/>]. Talk-in on 147.0450(+) PL 156.7, WA3GVI 2-meter rpt.

## JUNE 30

**QUEENS, NY** The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot, Flushing Meadow Corona Park, 47-01 111th St., Queens NY. Vendor setup at 7:30 a.m. Buyers admitted at 9 a.m. Free parking. Food and refreshments. VE exams at 10 a.m. Admission by donation, buyers \$5, Sellers \$10 per space. Talk-in on 444.200 R, PL 136.5, and 146.52 simplex. Web site [[www.qsl.net/hosarc](http://www.qsl.net/hosarc)]. For further info, call at night only: Stephen Greenbaum WB2KDG, 718-898-5599, E-mail [[WB2KDG@Bigfoot.com](mailto:WB2KDG@Bigfoot.com)]. For info about VE exams, contact Lenny Menna W2LJM, 718-323-3464, or E-mail to [[LMenna6568@aol.com](mailto:LMenna6568@aol.com)].

## JULY 6

**OAK CREEK, WI** The South Milwaukee ARC Inc. will hold its 34th annual "Swapfest" on Saturday, July 6th, at the American Legion Post #434 grounds, 9327 S. Shepard Ave., Oak Creek WI, from 6:30 a.m. until at least 2 p.m. CDT. Free parking. A picnic area and limited free overnight camping are available. Admission \$5 per person, includes "Happy Time" with free refreshments sometime during the day. For a free flyer with map, write to The South Milwaukee Amateur Radio Club Inc., P.O. Box 102, South Milwaukee WI 53172-0102. Talk-in on 146.52 simplex and on many of the local repeaters.

## JULY 12, 13, 14

**BRYCE, UT** The 2002 Rocky Mountain Division ARRL Convention and 2002 Utah Hamfest will be held July 12th to the 14th at Ruby's Inn, Bryce UT, near Bryce Canyon



National Park. For more info please visit [\[www.utahhamfest.org\]](http://www.utahhamfest.org).

## JULY 14

**PITTSBURGH, PA** The North Hills ARC will hold its 17th annual Hamfest on July 14th, 8 a.m. to 3 p.m. at the Northland Public Library, 300 Cumberland Rd., Pittsburgh PA. The location is approx. 10 miles north of Pittsburgh on McKnight Rd., (Truck Route 19). At the 3rd traffic light after Northway Mall, turn left onto Cumberland Rd. Northland is on the left at the top of the second hill. From points north, take Route 19 south toward Pittsburgh. Follow the signs for McKnight Rd., and at the 4th traffic light turn right onto Cumberland Rd. If on Perry Highway, turn left onto Cumberland Rd. at the Sunoco. Talk-in and check-ins will be on 149.09 W3EXW, the North Hills ARC repeater. Free admission. Free parking. One free automobile-sized space per tailgater; each additional space \$5. Handicap/wheelchair accessible. Refreshments will be available. For more info contact *Joe Springer, 2601 Clare St., Glenshaw PA 15116*, or phone 412-486-1681. More info is also available on the Web site at [\[www.nharc.pgh.pa.us\]](http://www.nharc.pgh.pa.us).

## JULY 21

**WASHINGTON, MO** The 40th Annual Zero Beaters ARC Hamfest will be held July 21st, 6 a.m. to 2 p.m. at Bernie E. Hillerman Park. There will be a ham radio and computer flea market, technical sessions, ham radio demonstrations and more. Free parking. Free admission. Talk-in on 147.24(+) rptr. Watch for green on white hamfest signs. VE exams registration starts at 9 a.m. Walk-ins welcome (limit 60). Bring original license and a photocopy. For info SASE to ZBARC VE Exam, P.O. Box 1305, Washington MO 63090.

## JULY 27

**CINCINNATI, OH** The OH-KY-INARS, Inc. will sponsor their 5th Annual Hamfest at Diamond Oaks Career Development Campus, 6375 Harrison Ave., Cincinnati OH. This facility is located just east of I-275 and I-74. Take I-74

to the Rybolt Rd./Harrison Ave. exit (exit #11). Go east on Harrison Ave. Diamond Oaks is located on the right (south side) of Harrison Ave., less than one mile from the I-74 exit. Special seminars, transmitter hunts, indoor vendors (setup Friday 5 p.m.-7 p.m. and Saturday 6 a.m.-8 a.m.), outdoor flea market (setup 6 a.m. Saturday) — first space free with admission ticket. Additional spaces \$3 each. Indoor vendors bring your own extension cords. Electricity not available outdoors. VE exams at 8 a.m. Walk-ins accepted. Refreshments, free parking, handicapped parking available. Talk-in on 146.670(-) and 146.925(-) rptrs. Admission is \$5 in advance, \$6 at the gate, age 12 and under free. Indoor vendor tables (6 ft. with free electric) \$10 each. Contact *Lynn Ernst WD8JAW, 10650 Aspen Place, Union KY 41091-7665*. Phone 859-657-6161; E-mail [\[wd8jaw@arrl.net\]](mailto:wd8jaw@arrl.net). Web [\[www.ohkyin.org\]](http://www.ohkyin.org). Expected attendance 650-750.

## AUG 11

**BAYVILLE NJ** The Jersey Shore ARS will host their Hamfest August 11th at the Bayville Fire House, Route 9, Bayville NJ. Talk-in on 146.910 MHz PL 127.3, and 443.350 MHz PL 141.3. Setup starts at 6 a.m. and the doors open to the general public at 8 a.m. Admission is \$5. Tables reserved in advance are \$15 each, first come basis, includes one admission. Contact *Bob W2CE at 732-657-9339* or [\[hamfest@jsars.org\]](mailto:[hamfest@jsars.org]). VE exams registration is at 11:30 a.m.; testing starts at 12 noon.

## AUG 17

**OAKLAND, NJ** The Ramapo Mountain ARC will hold its 26th Annual Ham Radio and Computer Flea Market on Saturday, August 17th, at the American Legion Hall, 65 Oak St., Oakland NJ 07436. Talk-in on 147.49/146.49 and 146.52 simplex. Vendors' setup starts at 6 a.m. The event is open to buyers 8 a.m. until Noon. The kitchen opens at 7 a.m. Donations \$4. Spouse and kids admitted free. Inside tables \$10 each. Tailgate space \$8 per space. Please contact *Steve Oliphant N2KBD, 10 Glen Rd., Ringwood NJ 07456-2331*. Phone 973-962-4584, fax 973-962-6210, Club E-mail [\[rmarc@qsl.net\]](mailto:[rmarc@qsl.net]). Visit the Web site at [\[www.qsl.net/rmarc\]](http://www.qsl.net/rmarc).

## AUG 25

**DANVILLE, IL** The Vermilion County ARC will hold their 2002 Hamfest August 25th at the Vermilion County ARC clubhouse, Woodbury Hill Rd., Danville IL. For more info contact *Terry Powell KB9REE, Vice President, V.C.A.R.A., P.O. Box 80, Catlin IL 61817-1007*. Phone 217-446-1379, or E-mail [\[KB9REE@YAHOO.COM\]](mailto:[KB9REE@YAHOO.COM]).

## OCT 5

**WARSAW, MO** The Twin Lakes ARC will sponsor the Warsaw MO Hamfest Saturday, October 5th from 9 a.m. to 4 p.m., at the

Warsaw Community Bldg., one block west of the square. Talk-in on 147.300 on the Warsaw rptr. Setup is at 5:30 a.m. Admission \$2 at the gate. 8 ft. tables \$10 each (hurry, only 30 available). Breakfast and lunch will be served on site. For more info call *Gene at 660-438-8650*, or E-mail to [\[gpo@advertisenet.com\]](mailto:[gpo@advertisenet.com]).

## SPECIAL EVENTS, ETC.

### JUNE 8

**BEDFORD, VA** The Roanoke Valley ARC and the Franklin County ARC will operate special event station WW2DDM on June 8th, commemorating the first anniversary of the dedication of the National D-Day Memorial in Bedford, VA. WW2DDM will be on the air from 1400-2400 UTC on 80, 40, 20, 15, 10, 6, and 2 meters on CW, SSB, PSK-31 and RTTY. For a QSL card, send SASE to *Charlie Beckwith K4BSF, 563 Buzzard Rock Ln., Rocky Mount VA 24151-4844*. For more info visit the Web site at [\[www.qsl.net/www2ddm\]](http://www.qsl.net/www2ddm).

### JUNE 8-22

**RICHLANDS, NC** The Onslow ARC, WD4FVO, will operate 1300Z June 8th to 2100Z June 22nd, to celebrate the opening of the North Carolina Opry and relocation of the WSMO studio. Transmission on local 2-meter FM, and HF 10-80 meters (excluding 30, 17 and 12). Certificate/QSL, *OARC, P.O. Box 841, Jacksonville NC 28541-0841*.

### JUNE 24-30

**HAGERSTOWN, MD** The Antietam Radio Association of Hagerstown MD will celebrate its Golden Anniversary (50th) with Station W3CWC operating June 24th to 30th. Listen near 7.240, 14.240, 28.440, 50.140 and locally on 147.090 MHz at various times during this special event. For a certificate, send QSL with contact information and a #10 or larger SASE to *Antietam Radio Assn., P.O. Box 52, Hagerstown, MN 21741-0052*.

### JULY 13, 14

**LAKE CHELAN, WA** Special Event Station W7H will be on the air from the shores of Lake Chelan from 00:00 UTC on July 13th until 23:59 UTC on July 14th. The Lake Chelan Radio Club (K7SMX) is sponsoring this event to commemorate the "World Hang Gliding Championships" being held over 10 days at this location. Listen for W7H on or near the following frequencies: 3.875, 7.250, 14.275, 21.325, and 28.450 MHz. Send an SASE for a special QSL, or \$4 for an 8 1/2 x 11 inch unfolded certificate to *Lake Chelan Radio Club, P.O. Box 1445, Chelan WA 98816-1445*. For more details visit the club Web site at [\[http://www.lakechelanradioclub.com\]](http://www.lakechelanradioclub.com). 73

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## Top Secret

*Why do amateur radio operators insist on making our hobby and service such a big secret? You'd think that it was a matter of national security. Maybe we just don't want to share, or maybe we think that we're that elite. For whatever reason, we aren't sharing our story very well.*

On March 14th, *USA Today* had an article on the competition for frequency space. They pointed out how there is such a demand for additional frequencies for new technologies that are emerging. Some areas of the country have some pretty significant demands, but there isn't the economic base to support the bidding wars that occur. A new wireless service in California can justify significant front-end investment, but a basic communications service for Alaska wouldn't. The article stated that the expected cost to acquire frequencies for a mobile phone service would be \$800,000.

As *USA Today* commonly does, the article included a graphic, in this case a spectrum showing what activities occupy particular frequencies. Television and FM broadcast radio were included as were cell telephone, garage door openers, and baby monitors. Citizens Band was there, as well as Automated Teller Machines and Global Positioning Satellites. Ham Radio was conspicuous by its very absence.

Now some might argue that it is good to keep a low profile when the topic is spectrum allocation, but I tend to disagree. The public does not clamor to have baby monitors taken off the air to free up frequencies for other uses. Of course, the other side is that they do tend to see a value in baby monitors. Do they see value in ham radio? They might, but they have to first know that it exists before they see any value in it. We need to make sure that people see and understand the value that ham radio has to them. The fact that it has value to us doesn't matter — it has to demonstrate a value to the average person on the street: the very people who never read *73 Amateur Radio Today*, but do read *USA Today*.

What should we tell these people and how should we tell them? As I've pointed out in some recent columns, there are good ways

to publicize our benefit. I was very pleased to have quite a number of readers send me their thoughts on this. Thanks to everyone who dropped me a note. Generally, most folks who wrote were in agreement with some of the key points of the article. As usually occurs, the ideas they shared with me were more interesting than what I included in the original article! That's the reason that I appreciate the feedback.

Several folks pointed out that the ARRL could or should do more to promote the image of amateur radio. They have full-time staff, resources, and influential contacts. It just seems to make sense. Although the League has a role to play, I tend to believe that the local angle cannot be overstated. The greatest article or public service announcement has to get the attention of the editor at the local newspaper or television station. Local interest may be more important and the same type of story may get more attention if it has a local flavor. If amateur radio is to be appreciated, it will be because it has a value to this town. Unfortunately, when the tornado or hurricane hits, the news is going to be focused on the damage the storm caused, not how well amateur radio performed. Yes, amateur radio made a difference, but so did the Red Cross, the Salvation Army, the Police Reserve, the National Guard, etc. When the chips are down, many people stand up and help out.

Another interesting comment that was passed along was that public service agencies tend to build their power base on the budget they receive. As such, paid employees are a measure of the importance of the agency and volunteers are discouraged. Volunteers in many cases are seen as interference during normal operations, and won't have the benefit of experience for use in an emergency. The one area I have seen where this has taken a different direction is in

Florida, where police and fire departments use volunteers for communications, and even a "Citizen On Patrol (COP)" auxiliary.

So what can we do? Let's start with a few philosophical ideas.

a. It's up to me. If each of us expects someone else to do it, we cannot guarantee that it will ever get done. On the other hand, if I decide I'm going to do it, I can ensure that things get done. This doesn't mean that they'll always be successful, but it does mean that it will at least get attempted. I believe that if I try often enough, sooner or later I can't help but succeed.

b. Have a positive attitude. Recently I contacted some hams about helping a hospital that has a specific role to play in a particular type of terrorist attack. Most of the hams were quick to offer to help. One, though, launched a dissertation as to why this would be illegal since it supported the hospital's business. I'm sorry, but I don't think anyone's normal business includes a disaster or an attack. We need to have and project the idea that we are ready, willing, and able to do whatever is necessary to help out our community in times of emergency.

c. Find a champion. Is there a member of the local ham club who is a police officer, fireman, or politician? See if they can help open some doors.

d. Choose a spokesperson. Is the news anchor the smartest person at the television station? Not necessarily, but he or she can present well. Choose someone who can do the same for your club or organization. As much as we'd like to believe otherwise, not every one of us can do this. We need to get our message across, not necessarily massage someone's ego.

e. Don't expect to be invited in the front door. Our story won't be on the front page

*Continued on page 57*



## AMSAT Field Day 2002

*It's that time of year again; summer and Field Day! Each year, the American Radio Relay League (ARRL) sponsors an emergency preparedness exercise called Field Day. The event takes place during the fourth weekend of June. Individual hams and ham clubs compete to make as many contacts as they can from remote locations using emergency power and portable stations.*

For 2002, Field Day starts at 1800 UTC on June 22nd and continues till 1800 UTC on the 23rd (2100 UTC for those that begin setup no earlier than the beginning of the event). The Radio Amateur Satellite Corporation (AMSAT) promotes its own version of Field Day for operation via the hamsats, held concurrently with the ARRL event.

While the ARRL [<http://www.arrl.org>] rules provide a 100-point bonus for the successful completion of a single amateur-radio satellite contact, the AMSAT rules promote activity on all of the current operational satellites. The AMSAT [<http://www.amsat.org>] rules worked well last year, and show only minor changes this time.

The congestion on UO-14 and AO-27 was so intense in 2000 that rule changes for 2001 allowed only one contact per each FM, single-channel satellite. Even with the change, those stations with dual-band HTs using simple whip antennas didn't have much success, but more folks at least got a chance to make a contact. Once again, stations that have completed their single contact via a particular FM satellite are encouraged not to make any further contacts via that satellite during the Field Day period.

The big change for 2002 is the addition of voice contacts with the International Space Station. Like the FM satellites, only one contact is allowed per station for the duration of the event. One digital contact via the ISS packet digipeater or PCSat (now Nav-OSCAR-44) is also allowed. In March 2002, NO-44 was having significant power problems, so it is questionable if it will survive long enough to be available for Field Day, but packet via ISS is expected to be active.

The first-place, emergency-power/portable station will receive a plaque at the

AMSAT General Meeting and Space Symposium in Fort Worth, Texas, November 8-9, 2002. Certificates will be awarded for second and third place, emergency-power/portable operation in addition to a certificate for the first-place home station running on emergency power. Stations submitting high, award-winning scores will be requested to send in dupe sheets for analog contacts and message listings for digital downloads. Check the AMSAT Web page for details and a sample entry form.

There are some good reasons to consider participating in the AMSAT event if you are serious about chasing satellites on Field Day. The AMSAT rules recognize the individual hamsats as separate bands, thus promoting the pursuit of all of the "birds" for the duration of the event. AMSAT also encourages digital satellite activity. Special Field Day messages are sent to the "digisats" for download points by anyone who can receive them. It's even possible to participate in the AMSAT event and get points without a license. While monitoring the downlink from the digisats, complete short Field Day Greeting messages can be received without ever transmitting.

### Making choices

It would be nice to try to work every active hamsat in the sky on Field Day, but it's just not possible without a lot of gear and a lot of club members or active participants in the satellite chase. The best thing to do is to pick satellites that have transponders, either analog (voice and CW) or digital (1200 or 9600 baud), for which you have equipment.

If you are considering ONLY the FM voice satellites like UoSat-OSCAR-14 or AMRAD-OSCAR-27, don't, unless you are simply hoping to make one contact for the

ARRL rules bonus points. Even with the rule changes for 2001, the FM voice satellites turn into a solid FM-repeater pileup during Field Day. It's fun listening, but that's not what Field Day is all about. Diversify. Gear up for other voice/CW hamsats.

If you have worked the satellites on Field Day in recent years, you may have noticed that a lot of good contacts can be made on some of the less-populated, low-earth-orbit satellites like Fuji-OSCAR-20, Fuji-OSCAR-29, and RS-12/13. During a typical workweek, contacts are few and far between, but during Field Day the transponders come alive like 20 meters on a weekend. The good news is that the transponders on these satellites will support multiple simultaneous contacts. The bad news is that you can't use FM — just low duty-cycle modes like SSB and CW. AMSAT OSCAR-10 can also be a lot of fun on Field Day if the solar panels are properly illuminated and it is in a good position in the sky for Field Day. Plot some orbits and check it out.

This will also be the first year for AMSAT OSCAR-40 on Field Day. Predictions show good opportunities during Sunday morning hours. Satellite enthusiasts have been waiting for this moment for a number of years. It's here. Make the most of it!

### Equipment

The best radios for Field Day are the ones you use at home, unless of course, they are heavy antiques. If you have one of the newer, all-mode HF/VHF/UHF transceivers, take it with you. If you don't have one, find someone who does, and borrow it. Be sure that it can transmit on the satellite uplink band while simultaneously receiving the downlink band. Practice prior to the event. There's nothing worse than trying to figure out a strange radio while you are



hunting for a satellite, keeping tabs on uplink and downlink frequencies, and adjusting for Doppler — all at the same time. Have a backup station. During one Field Day event, our group had to dig out the backup to the backup due to power problems.

Be prepared to at least work SSB and CW on Mode J (two meters up and 70 cm down) via the Fujis. With a nice set of two-meter and 70-cm directional antennas, AO-10 Mode B (70 cm up and two meters down) can be a lot of fun on a good day. A station that is ready for AO-10 is just a small step away from Mode U/S via AO-40. The 70-cm uplink for AO-10 will do fine for AO-40, and the two-meter receiver can be used as the “IF” or intermediate frequency for an AO-40 S-band downconverter. There are now many easily converted, and cheap downconverters available. Check out [<http://members.aol.com/k5oe/>] for some ideas.

Unless you have experience with low-power satellite work, don’t try satellite “QRP” on Field Day. It’s really hard even for the best satellite operators, and can be quite difficult and disappointing to demonstrate to potential newcomers. There are too many inexperienced satellite operators on the air during Field Day and many are trying to deal with noisy generators, bugs, and unfamiliar radios. Listening for weak stations is too much to ask.

## Antennas

A simple system for RS-12/13 or RS-15 Mode A can get by with a dipole in the trees for 10-meter reception and a ground plane in the clear on the two-meter uplink. Most serious satellite operators will have an antenna system that will rival many home stations’, with large circularly-polarized Yagis positioned by azimuth and elevation rotors. Something in between these extremes should suffice. A small dish with S-band downconverter can easily be included in any medium- to large-size satellite array designed for two meters and 70 cm.

## Predictions

Don’t assume that you can take a laptop computer to Field Day and do your predictions after you get there. Plot all of your potential satellite passes in advance for every satellite you intend to pursue. Check the results. Look for timing conflicts. Instant Track 1.50 from AMSAT provides some scheduling functions that will help, and it runs on almost any PC. Make sure that the coordinates of the Field Day site and recent satellite element sets have been entered into the software. Don’t forget to take along

some satellite frequency guides — unless you are one of the few that has memorized all the uplink and downlink bands for all of the operational hamsats in orbit.

Also check the operating status of your target satellites prior to Field Day. For example, RS-12 and RS-13 have occasionally been switched into Mode K (15 meters up and 10 meters down) and Mode T (15 meters up and two meters down). Be ready for surprises.

## Power and interference

There is nothing worse than having all the gear, antennas, predictions, and accessories ready to go, and then discovering that you can’t hear anything but noise on the downlink frequencies. It happens a lot. Noisy power sources are the number-one culprit. If you can operate with batteries, do it. Satellite chasing is considered weak-signal work. Most of our hamsats only have a few watts’ output to simple antennas. They can be hard to hear. A typical consumer-grade gasoline generator can produce a lot of noise in the RF spectrum. Be sure to test your generator prior to Field Day. Check it with your satellite rig for a few passes. If it is noisy, either cure the problem or get another power source.

Don’t forget about “the other guy.” Most Field Day operations include multiple stations for HF, VHF, and satellite work. The folks in the tent next door on 10 meters can ruin your best attempts to make Mode-A contacts. Coordinate with them so that they can go to another band or take a break during those short intervals when the RS hamsats come by.

If your group operation has any terrestrial VHF stations or two-meter packet systems, they can destroy any chances you might have had hearing AO-10 on Mode B with its two meters downlink. As with the HF folks, make your intentions known and arrange for an operating schedule, in advance. Even with all these precautions, it is always a good idea to isolate the satellite station from the others. A high-power 20-meter SSB rig will almost always mess with a 10-meter receiver just a few feet away.

There are even a few potential interference problems associated with S-band reception of AO-40. Microwave ovens and wireless 2.4 GHz devices like wireless LAN cards and portable phones are at the top of the list. It is doubtful that there will be a problem, but check first! A lot of mobile homes have microwave ovens, and hams tend to be techno-geeks who collect new toys just to see what they will do.

## Have fun!

You may have multiple rig difficulties, antenna failures, computer glitches, generator disasters, tropical storms, and even satellite problems, but the goal is to test your ability to operate in an emergency situation. Try different gear. Demonstrate satellite operations to hams who don’t even know that the hamsats exist. Test your equipment. And finally, have fun doing it!

## The ARRL Field Day hamsat rule

The following item is from the American Radio Relay League Field Day rules at the ARRL Web site.

7.3.7. Satellite QSO: 100 bonus points for successfully completing at least one QSO via an amateur radio satellite during the Field Day period. Under the “General Rules for All ARRL Contests” (rule 3.7.2.), the no-repeater QSO stipulation is waived for satellite QSOs. Groups are allowed one dedicated satellite transmitter station without increasing their entry category. Satellite QSOs also count for regular QSO credit. Show them listed separately on the summary sheet as a separate “band.”

## The AMSAT Field Day Rules

The AMSAT Field Day 2002 event is open to all amateur radio operators. Amateurs are to use the exchange as specified in the ARRL rules for Field Day. Note that no points will be credited for any contacts beyond the ONE allowed via each single-channel FM satellite. Operators are encouraged not to make any extra contacts via these satellites (Ex.: UO-14 & AO-27). CW contacts and digital contacts are worth three points as outlined below.

1. Analog Transponders.
  - a. Each satellite transponder is considered a separate band.
  - b. All phone QSOs and all CW QSOs on a given satellite transponder are considered separate bands.
  - c. All packet/RTTY/ASCII/AMTOR QSOs through analog transponders are counted as CW QSOs for scoring purposes.
  - d. Phone QSOs count for one point and CW QSOs count for three points.
  - e. Cross-mode (CW/phone) contacts are not allowed.
  - f. Only one contact is allowed via each single-channel FM satellite, UO-14 (1 phone), AO-27 (1 phone), ISS (1 phone and 1 digital), PCSat (1 digital).

*Continued on page 57*



## The Qualcomm 2.x GHz to 10 GHz Multiplier

*This project was started last month, and describes a local oscillator system consisting of a 2 GHz frequency-agile synthesizer. This synthesizer is capable of providing to many frequencies from 2.3 to near 2.8 GHz in either 2 or 5 MHz steps.*

The original unit was programmed for operation at the spot frequency of 2620 MHz and multiplied to 13.1 in the multiplier. This multiplier unit can be converted easily by retuning the stripline elements to a lower frequency for many different applications, including local oscillators for 10 GHz transceivers and 12 GHz schemes for 24 GHz applications. Many other uses are also possible and are left to the designer's imagination. These include many possibilities in the 2 GHz frequency range as fundamental frequency operation for 2304 MHz or AO-40 uses.

Let's get into the meat of this month's modification, the multiplier board, and my thanks to Ed Munn W6OYJ and Kerry Banke N6IZW! Without their help and

assistance, this project would not have taken form.

Originally, this board was used at a frequency of 13.1 GHz, with an input of 2620 MHz. Retuning of stripline elements and filters is required to lower resonance of these filters to the new desired frequency. Techniques required involve making some tuning tools, which are constructed from round toothpicks cut at a diagonal at one end to remove the sharp point, and super-gluing a small bit of copper to the oval cut end of the tooth pick. Several different sizes of tuning tools are constructed to provide a range of adjustment tuning strips consisting of different sizes of copper bits.

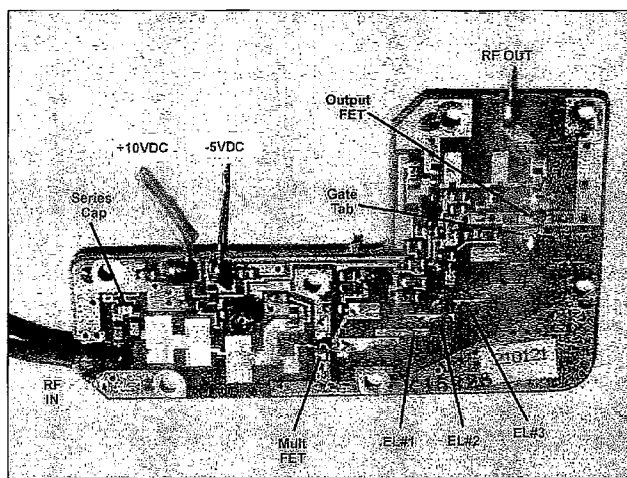
In actual use, power up the board with DC power and RF drive at the new frequency. Test

it with power off. Reapply power and retest till no increase in power can be obtained. If power drops when placing a tool with a bit of copper near the element being tested, decrease the copper soldered bit or line length with an X-acto knife and retest for increase in power. We call this procedure "snow flaking." Take your time and don't short out other parts to the element being tested. Once the smoke is let out of a device by shorting something out, it's hard to put the smoke back in. Hi.

First, some technical specifications concerning the Qualcomm multiplier. The PC board is set for 2.620 GHz times 5 to 13.1 GHz, with a drive level at 2 GHz of +10 dBm, and provides about +7 dBm output power at 13.1 GHz. The PC board is quite small, measuring 1-5/8 inches by 2-3/4 inches. The board is populated with two stages of MGF-1302 FETs and two DC control transistors, one for each FET. The first stage multiplies to 13.1 GHz, driving a stripline filter to the second-stage power amplifier. DC power requirements are minus 5 volts bias and plus 10 volts DC. (When powering, be sure that minus 5 volts is applied first before the +10 DC.)

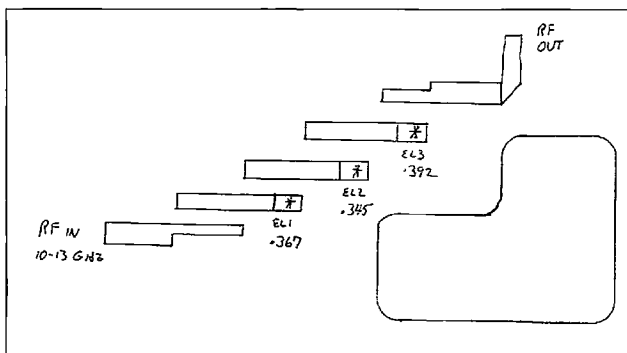
The multiplier PC board is quite small, and having a notch in the PC board 3/4 x 1-1/2 inches in size allows a small internal negative power converter to use this open space. This power converter would provide negative voltage generation of 1 mA or so, driven by the +10 voltage regulator, allowing the PC board to be self-contained operating from +12 volt DC supplies. I still have not made this modification to my unit as shown in the photos as I apply bias (-5 V) and +10 volts externally to my units.

Add two SMA coaxial connectors for input and output and that finishes the package. This board is a natural to drop into a milled

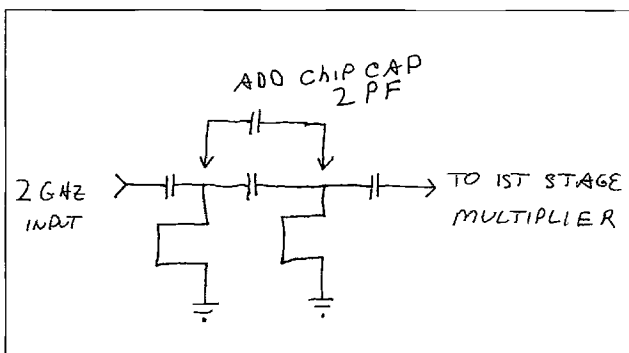


**Photo A.** Qualcomm multiplier showing DC power, RF ports and the 4th harmonic filters that need modification to their length. The filters to modify are EL1, 2, and 3. They are extended on right side of filter toward the open section of board, which gives access to allow the added length of the filters. Measure exact length starting from leftmost section of element and mark end on rightmost side of filter element for proper length of new filter frequency.





**Fig. 1.** Filter modifications. Drawing showing where to place copper extension elements to stripline filter for new frequency desired. Lengths shown for 10224 MHz; very functional at 10368 MHz also.



**Fig. 2.** Input filter. Drawing to show where to add piggyback chip cap to existing 2.620 GHz filter to improve lower frequency performance at 2592 MHz.

housing for frequency multiplication schemes in the 10 to 13 GHz frequency ranges. Other solutions for containers or simple box construction will be described later. Also, just for mention's sake, there was an earlier older version of this PC board that used a different modification filter scheme. This much larger PC board used a 1-inch copper pipe cap filter in place of the stripline filter used on the new smaller board. This larger older PC board was covered in a 1994 73 Magazine article. Having a smaller multiplier is much more desirable than the older larger unit. Not only size improvements but also more efficient stripline filters make for a far better package profile in this conversion.

### The modification

A 2 pF chip cap is required to modify the input filter at 2592 MHz. Modifications to the multiplier circuit filter consist of extending the filter lines with strips of copper soldered to the stripline filter elements. This retunes the filter for best output at the 4th

harmonic for a 10 GHz LO. The filter element lengths described in this conversion are optimized for 10224 through 10368 MHz. For other frequencies, some length adjustment will have to be altered accordingly for that new frequency. Typical output power can be +4 to +8 dBm. This, of course, depends on drive and retune success.

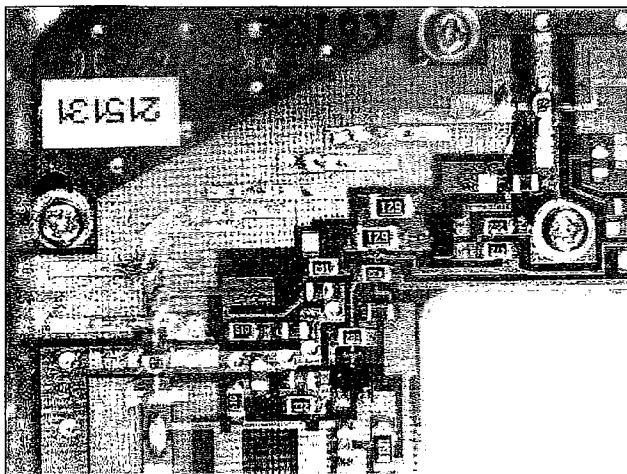
The conversion consists of adding the 2 pF chip cap soldered on top of the existing input filter "SERIES" chip cap (NOT THE SHUNT CAPS, WHICH GO TO GROUND). This will lower the filter frequency from its original frequency of 2.620 GHz to something in the 2.592 GHz range. This filter is connected directly to the 2.5x GHz RF input coax line. Next, extend the filter elements located between the first stage multiplier output to the second stage amplifier input. The length of the 1/2-wave filter elements is modified by adding copper extensions to the open side of the filter elements only. The element lengths are, from left to right: EL1 = 0.367 inch, EL2 = 0.345 inch, and EL3 = 0.392 inch for best

output in the 10.224 to 10.368 GHz region. Additionally, add a small snowflake size determined experimentally for best overall multiplier output on the gate of the FET amplifier. Experiments dictate that for best performance this snowflake locates on the gate of the amplifier stripline toward the resistor marked "510". Adjust size for best gain at the output of the multiplier PC board.

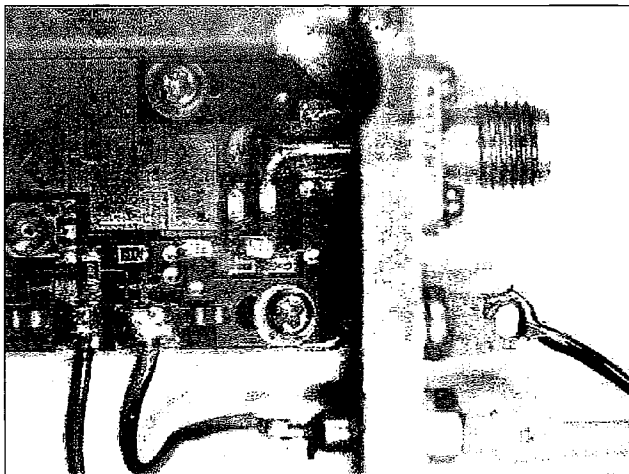
Power for the multiplier is -5 volts bias at 1 mA approx., and +10 volts DC. The same voltage regulator power supply for the synthesizer can be used to provide the +10 volts required for the multiplier board. A surplus power supply board is used to provide the required +10 volts and -5 volts bias feeding both PC boards.

In **Photo B**, the completed marker synthesizer unit is shown. It functions on 2592 MHz with a power output of +10 dBm. This port drives the multiplier conversion to produce some amplified power at 10.368 MHz, the 4th harmonic of 2592 MHz. Additionally,

*Continued on page 58*



**Photo B.** Close-up of filter modification length adjustment soldered onto PC board with same-width copper strip to extend length of 1/2-wave filter.



**Photo C.** Close-up of input filter with chip cap added on top of the existing filter chip cap.



## Transmitter Hunting as a Public Service

*Hams serve the public in many ways. VHF and repeater enthusiasts coordinate parades, races, and every kind of “-thon” imaginable. ATV and packet fans help out with their special equipment. DXers provide communications for foreign countries after earthquakes and other disasters. What about hidden transmitter hunters?*

Your radio direction finding (RDF) skills could be of benefit to your fellow hams and neighbors, and the other citizens of your community. Over the last 13 years, “Homing In” has chronicled the good works of T-hunters as they tracked downed aircraft, solved interference from defective equipment, and tried to keep their repeaters free of jammers. Right now, one Internet foxhunting group mailing list is busy with discussions of joint exercises with the Civil Air Patrol. The “Homing In” mailbag (electronic and postal) is full of input from hams who are pitching in.

The first example comes from frequent contributor Tom Lewis AB5CK, who wrote to say that the problem of long-range unlicensed cordless telephones came to Fort Worth, Texas, last November. Hams began overhearing very personal conversations on 145.12 MHz, with no identification. “Using RDF equipment, the signal was tracked to a home in northwest Dallas,” he wrote. “That was more than 18 air miles from our starting point in Fort Worth. The phone’s performance was enhanced by a chimney-mounted scanner-type antenna fed with small coax. This provided the owner with high-quality conversations as he drove around the Dallas area.

“We contacted the Dallas FCC Office and presented a copy of the ARRL Letter issue that asked FCC to investigate long-range cordless telephone sales,” Tom continued. “FCC responded quickly, verified the location of the unlicensed transmissions, and contacted the party using the equipment. Less than two weeks later, the offending device was surrendered to the FCC. It was made by Delta International in Taiwan. The owner was overheard saying he purchased it from a business in Arkansas.”

### Jingling spurs everywhere

How many blockhouses full of commercial, government, and amateur radio gear are on hilltops in your area? Most remote transmitters operate for decades with no problems, but when one malfunctions, it might not be apparent to the owners. Instead, it may become a mystery signal that affects other spectrum users. Ken Thompson NØITL of Wichita, Kansas, wrote with an example. He has been doing RDF for many years, catching jammers and chasing radio-equipped balloons launched by his local club. He prefers his Roanoke Doppler RDF set,<sup>1</sup> which he has equipped with separate antenna systems for VHF (two meters) and UHF (70 cm and above). **Photo A** shows the sturdy UHF Doppler array that he recently finished.

Ken wrote, “On a hot Saturday evening of late, the scanner in my garage heard a continuous tone signal coming through the Wichita 146.85 machine with no identification. It was heard on the input side, but just as I got RDF gear set up, the signal went away. The repeater’s technician told me that they had been hearing it for a couple of weeks, so I waited until the next day and listened again, with success this time. The signal was very weak into my RDF equipment, but good enough to get a general direction. After one detour, I was able to drive right to the source.

“The spurious emission went away before an engineering contact for the site could be met. But it appeared again at a higher frequency. It was bringing up 146.85 for only a while each evening because it was sliding up in frequency as the heat of the day went away. It was at 146.25 at 8:00 p.m., and by 11:00 it was up to 146.61. Contact was eventually made with the duty person

at the site, but together we could not isolate the source inside the building. The strongest signal was coming from the tower.

“The site has two other major customers, one with a separate building on the property. The engineer for that transmitter was contacted the next morning and agreed to meet at noon at the site. It only took him a minute to find and turn off a malfunctioning studio-transmitter link (STL) radio.”

Then there was the E-mail I just received from Clint Turner KA7OEI of West Jordan, Utah: “One of our repeaters was being triggered every 42 seconds or so with low-level Bell 103 tones on the audio. We put out the word and sure enough, someone reported hearing it on the input.

“It turned out to be a 173.625 MHz telemetry transmitter on a water tank. It also put out a strong spur in the 158 MHz area, in addition to the 146 MHz area. The fact that it was nearly 40 miles away, geographically obstructed from the Salt Lake area, and on a yagi, made RDF more difficult. We used signal strength (using my FT-817 in USB mode) as well as a Doppler RDF set. Another local ham visited the site in daylight with a service monitor to verify the presence of the actual signal, as well as see the other spurs and make signal strength measurements.”

### Calling Dr. Jones!

Those spur-tracking tales bring to mind a similar problem a few years ago in Los Angeles. At that time, most open repeaters had carrier access, with no requirement for subaudible tones on the input. Users were used to occasional “kerchunks,” but several repeaters began to experience them regularly, often with snatches of medical-related messages in the audio. Monitoring on the input range revealed that a spur



from a paging transmitter was slowly sweeping from 146.4 to 146.2 MHz on every transmission, bringing up repeaters as far away as Running Springs in the San Bernardino Mountains.

Apparently a lot of paging was going on, because there were a lot of these sweeps. It was worst in the late afternoon, making us suspect that the transmitter was in a room that got hot that time of day, bringing on the spurs. While following the sweeping spur with one receiver, I used a scanner to check all the authorized paging frequencies for southern California. Sure enough, exactly the same paging audio was on 171.3875 MHz, which was licensed to the Veterans Administration hospital in west Los Angeles.

After using RDF to confirm that the spur was indeed coming from that site, it was time to make contact and get the transmitter fixed. That's when the frustration began. "No problem," said the hospital's Communications Manager. "Here's the number of the dealer. We have a service contract, so just explain the problem and they'll fix it."

That sounded easy, until the manufacturer's representative told me that the contract only covered routine services. "This problem requires replacement of the transmitter, which the contract doesn't cover," he explained. "We sent them a memo to that effect."

At that point I became a reluctant intermediary in the middle of the dispute between a government agency, its radio service contractor, and the transmitter manufacturer. The hospital had no incentive to solve the problem without prodding, because its own radios and paging weren't being adversely affected. Administrators didn't seem to mind that their private medical messages were being retransmitted all over the southland. So I had to keep calling the various players, getting responses such as —

Hospital Communications Manager: "We wrote a purchase order for the new transmitter."

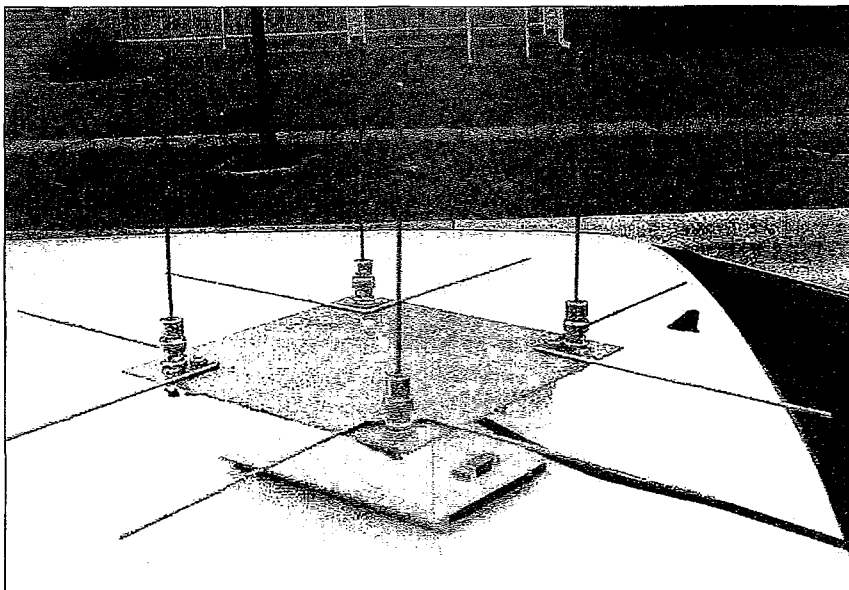
Service Contractor: "We haven't gotten any purchase order."

Telecommunications employee replacing vacationing Communications Manager: "There's no purchase order on file."

Hospital Communications Manager upon return: "The purchase order had an error and had to be rewritten."

Service Contractor: "Not only do we not have a purchase order, we haven't even been told to expect one."

Hospital Communications Manager: "The purchase order is rewritten and is probably in the signature chain."



*Photo A. Ken Thompson NØITL built this wide range Roanoke Doppler antenna array for UHF. He eliminated the lugs holding the radials to make it more rugged. (Photo by NØITL)*

Contractor's Receptionist: "He's out today."

Communications Manager's Secretary: "She's too busy to talk to you."

Now if I had a leaking water pipe on my property that was flooding my neighbor's yard and filling his basement, the neighbor would have no trouble getting local government to force me to stop the flood in minutes, not weeks, whether I had a service contract with a plumber or not. Similarly, you would think that hams whose repeaters were being "flooded out" could get authorities to force the VA to fix its interfering transmitter immediately or shut it off. But, as they say, "Who ya gonna call?"

What about the FCC? Yes, I tried. The local Engineer-in-Charge told me that the FCC doesn't have licensing authority over government agencies, so he couldn't issue a notice of violation. Another dead end.

After many weeks, the problem was finally fixed. Calls to doctors and nurses no longer rang out through southern California repeaters. This was before Riley Hollingsworth began handling ham matters in Washington. With that in mind, I wonder if a fix would have come faster if the same problem happened again today.

#### **What's a DGPS RTK?**

I confess that I'm a bit envious of Ray Grimes W6RYS because he gets to hunt transmitters in the line of duty as a Senior Staff Engineer for Motorola. It seems as if all of his hunts have interesting twists to them. For instance, he just wrote, "I got

involved with an 800 MHz interference problem where antenna flashing light displays were found in cellular stores and kiosks at shopping malls. The imported demonstrator units for these little antenna-top bulbs could wipe out cellular and public safety radios for a block radius. My customer purchased one of these demonstrators and gave it to the Cerritos (CA) FCC office to examine." FCC-Washington issued a notice banning them shortly thereafter.

W6RYS has also located several interference-producing wireless local area networks (LANs) for in-building coverage that were connected to outdoor gain antennas atop tall structures. One affected five cellular sites and fire department radios throughout a two-mile radius. If you have 800 MHz QRM in your area, these are the type of emissions that you may have to hunt down.

Ray recently returned from Salt Lake City, where he was a member of the Utah Communications Agency Network (UCAN) Interference Reduction Team (IRT) for the Winter Olympics. IRT members came from Motorola, the cellular carriers, local and state governments of Utah, the FCC, and the Secret Service. "Thanks to two years of preplanning and RF engineering efforts by the UCAN team members, we had relatively few RFI problems, considering the many RF sources operating in the area," he reported.

Most interesting to me among Ray's recent interference chases was one that he and Jim Carter WB6HAG took on in Irvine, California. This report is courtesy of *Net Control*, the excellent monthly publication



of Orange County RACES. Ray is Chief Radio Officer for that organization.

"For several weeks, a city's public works repeater was plagued with signal bursts on its input frequency near 456 MHz. Each burst lasted about a second, with an interval of about a second between them. There was a brief tone at the start of each burst.

"The signal was so strong as to be copyable at the Long Beach airport, over twenty miles from the city. Bearings were inconsistent, indicating lots of signal reflections, which is typical of UHF signals in urban terrain. Orange County RACES was requested to assist in locating the source.

"According to W6RYS, 'The interference was only on the air during weekdays between 7 a.m. and 4:40 p.m. It was off the air on a Monday holiday and also off the air on another Monday and Tuesday when I wanted to hunt it.'

"Strong signals were present in downtown Santa Ana and near Irvine Medical Center, but several days of ghost-chasing there provided only frustration. Then Ray noticed that the signal was especially strong on the south side of the hospital tower building and

in the industrial park to the east. It was even greater on the 405 freeway under the Laguna Canyon Road overpass, which was closed for construction.

"Ray drove through the construction area on the south side of the freeway two times, to the limits of his vehicle on the bad roads. Using a scanner, directional antenna and attenuator, he convinced himself that the signal emanated from due south of the Sand Canyon Avenue off-ramp of the freeway. So his next step was to visit the construction company's office trailer.

"When he asked if the company had any UHF transmitters in operation, the employee offered him a ride in a truck on rough-cut trails to a hilltop about a mile south of the freeway. There, out in the open, was a Leica outdoors-rated GPS receiver, a Pacific Crest Corporation (PCC) 35/2-watt UHF data link transmitter, a quarter-wave antenna on a 12-foot PVC mast fed with RG-58/U, and a 12-volt truck battery, all assembled on a tripod.

"The employee said that this was their GPS differential correction system,' Ray explained. 'They use it to precisely plot areas to be graded and to direct heavy equipment for contour-grading tasks. The employee shut off the UHF transmitter and the public works repeater interference ceased. He explained that the reason that the transmitter was off the air on the Monday and Tuesday was that they were not able to grade on those days because of rain. He also claimed that the full 35 watts was necessary to produce a usable signal at their receiving locations.'

"Data links such as this provide construction and survey crews with much more precise location information than ordinary GPS does. They incorporate both Differential Global Positioning System (DGPS) and Real-Time Kinematic (RTK) technologies to achieve position errors of less than two centimeters. Data linked from the tripod-mounted GPS set at a carefully surveyed location makes automatic corrections to GPS satellite data received by a roving RTK-equipped grader or surveyor.

"Could this problem occur in your area? Pacific Crest is very careful to explain the need for legal operation of its data transmitters, which are synthesized and can be on VHF high-band or UHF. PCC's 44-page *Guide to Wireless GPS Data Links* and other application notes (available from [www.paccrst.com]) state that licensing under FCC Part 90 is mandatory, power must be limited, and the unit must be turned off when not in actual use. Approval by local frequency coordinators is required for operation on all

business-band frequencies except those designated for 'itinerant' use.

"FCC licenses now being issued for DGPS RTK require carrier monitoring to prevent a data transmission when other signals are on the channel, plus automatic CW identification every fifteen minutes. All RTK links now being shipped from PCC have these features.

"PCC's guide recommends that buyers contact local commercial frequency coordinators, even for itinerant operation, and that they monitor the chosen channel with a scanner before putting the link on the air. But a scanner or low-altitude receiver may not pick up activity on the input of a public works repeater. And given the nomadic nature of the construction business, it's easy to imagine a RTK system being coordinated in one town and then being moved to another job or transferred to another branch of the construction company without re-coordination. So if you hear short signal bursts with strange tones on a UHF frequency in your area, be prepared for an interesting hunt."

## All aboard for Slovakia

This is the absolute final call for applicants for Team USA to travel to the 2002 ARDF World Championships, September 2-7 at Tatranske Matiare in the High Tatras of the Slovak Republic.<sup>2</sup> Fourteen stateside radio-orientees have already expressed strong interest in attending and competing. Their current ages range from 11 to 60.

Most of the limited number of team slots are full, but there may still be openings in divisions for females and youth. Team members are responsible for their own transportation expenses to and from Slovakia. Entry fees are due in full to the Slovakian organizers by July 15, to be forwarded for the team by the ARRL.

For the latest ARDF Team USA news, see the "Homing In" Web site. The postal and E-mail addresses for your inquiries, plus your news of RDF activities for fun and public service are at the beginning of this article.

## Notes

1. Complete plans are in the book *Transmitter Hunting — Radio Direction Finding Simplified* by Moell and Curlee, published by TAB/McGraw-Hill, ISBN number 007-1560068. Updates are on the "Homing In" Web site.

2. Moell, "Homing In: USA's Foxhunters Take on the World," *73 Magazine*, April 2002.

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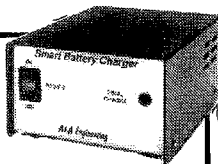
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## This Twist May Be for You

*A little farther into this article you will see that I had a few days of what may be termed "computer stress." That is, I did not have a computer hooked to the rig in my shack's comfort zone. There were alternatives, but by the time I got through some operating system calisthenics, I was in severe need of a digital-QSO fix.*

The best solution for this dilemma was to find something fresh and different to try. Just for a trip to revitalize the memory, I took a look at the listings in Dave's G3VFP listing (from The Chart), downloaded a truly different piece of software, and that was the beginning of a very fascinating trip.

### Difference with a purpose

Did you ever want to click on a whole bunch of PSK31 signal traces and monitor them all at once? If you have, be careful what you wish for. I just installed the W1SQLPSK software, and many simultaneous signal decodes is just one of the available features. This was one of the most unique digital experiences I have had in a long while.

I had heard of this software for some time and managed to get busy at all the wrong times, so this was my first encounter. Such fun. You really can monitor every signal displayed in your waterfall simultaneously. I have to warn you, it will boggle your mind and keep it that way if you try for too many at a time.

Of course, there is a screen space limitation in that all these messages are going to display on single lines. I had heard comments that this made for confusion. However, the author has taken all this into consideration and made this multi-read exercise into a workable and pleasant experience.

It wasn't until I read through the brief Help file that I realized all these messages did not have to be one-liners across the monitor, one below the other. With a little mouse-clicking, you can put as many as you desire in their own little windows and adjust the windows to whatever size is convenient. However, when you do this with very many messages, you will wish you were

displaying them on a big-screen TV. See **Photo A**. It tells a lot at a glance.

This program makes good use of the right-click of the mouse. When you right-click on a line of received text you get choices including expanding the line into its own window, making that channel the transmit frequency, parking (deleting the receive line), finding a callsign in the text, and clearing the window of text. It doesn't take long to get the hang of operation, and you just may become hooked.

What all this rhetoric means is I am writing this after the first rush from seeing so much available text that I could neither keep track of it nor keep the windows organized. And that is not because the author has not done his job to make it possible to keep everything organized. I think I have seen some young game players who could run circles around my efforts and take full advantage of many more windows than I have.

Before I go on, I will have to mention also that the program seemed to run flawlessly on my old 120 MHz 32M RAM setup with Win98. That speaks well for the software. You won't need a multigiga anything to let W1SQLPSK strut its stuff.

### It transmits, too

After I got about a half a handle on the reception scheme, it was time to see how it drove the soundcard and be certain just where the transmit frequency was. The first part: It drove the soundcard perfectly, producing a PSK31 signal with zero ALC with the same setting as for the last digital program I had used in the computer.

With that worry out of the way, I did a little close observation and some Help file reading, and then opened my eyes to realize that there is a box that displays the "Xmit Freq" just a couple of spaces above

the Receive window on the right side of the display.

Speaking of things such as PTT and Comm port settings, the Help file is very good about explaining this procedure. The setup is only slightly different than with software you are probably familiar with, and the instructions keep you out of trouble regardless of previous experience. So when I clicked the "Tune" button, the response was as expected and I could verify that the transmitted signal frequency was the same as the receive frequency by observing the waterfall:

The first time I tried this was much busier than when I made the screenshot, and I was not getting replies from the first few CQ calls I answered. Thinking perhaps I had an offset problem, I tried my own CQ and a ham came back as exactly on frequency as I could tell and we had an interesting chat. A little aside: He was running two or three watts and his signal from New Mexico was excellent to the very end. Sometimes I wonder why I habitually run 30 to 50 watts.

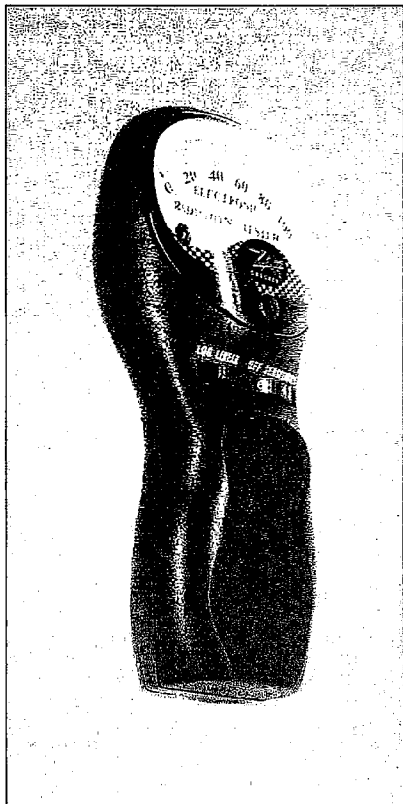
### Great built-in log and callsign lookup features

This software is designed with a dual thrust. It is not only a good PSK31 program, but also contains some advanced log features that make tracking awards and call lookup smooth and straightforward.

Many of us use one of the several callbooks on CD that is automatically accessed by the many ham communications packages available when we click on a callsign. W1SQLPSK makes use of eCallBook, which is an up-to-date database available via the Internet. On the W1SQL

*Continued on page 50*





## Zap Checker

The Alan Broadband Company has announced the Zap Checker, a high quality handheld instrument that detects and displays transmitted electronic energy. This new electronic device is comparable to a sensitive wideband receiver with signal

strength indicators. The Zap Checker is distantly related to electric-field-strength meters of earlier days — but with orders of magnitude greater sensitivity and broader bandwidth than the older devices.

The usable bandwidth of the Zap Checker extends from 10 MHz to more than 4.50 GHz. The instrument detects even weak transmissions in this bandwidth from surprisingly long distances. Devices that use this bandwidth include cellular and wireless phones, microwave ovens, computer wireless devices, UHF, VHF, service band and ham transmitters, hidden “bugs” and surveillance equipment, baby and security monitors, FM and TV broadcasts, and even electronic car keys and garage door openers.

The Zap Checker is extraordinarily sensitive. It can detect cellular phones and covert bugs at more than 20 feet, transmissions from “sealed” microwave ovens at more than 40 feet, and from VHF and UHF transceivers at more than 80 feet. The detection of transmitted signals by the Zap Checker is limited by the background level of radiated signals — usually determined by baseline FM and TV transmissions in the area.

The high sensitivity enables you to tune up low-power QRP transmitters and determine antenna radiation patterns from a distance (avoiding detuning effects), to measure RFI signals and pinpoint RF leakage in cables, to locate hidden transmitters

when foxhunting, to determine the optimum placement of computer wireless equipment, to monitor the radiation level at the baby’s crib, to detect hidden cameras and audio bugs, and much more.

A manually adjustable sensitivity control adjusts the gain over a >20 dB range.

The Zap Checker also has unique detection and display systems. Detection is in logarithmic or linear modalities. In log mode, the dynamic range of the instrument spans a 1,000:1 signal range. In linear mode, the device picks up the weakest signals for a full display. Display of the transmitted signal readings is either by an analog meter or by illumination of colored LEDs. The LED display allows the measurements to be viewed from a distance or at nighttime. A switch-enabled silent vibrator mode is included for situations in which it is undesirable to view the displays directly (such as at the top of a utility pole or when monitoring covert transmissions at a meeting site).

The durable, portable Zap Checker operates on 2 AA alkaline batteries (not included) for more than 80 hours, weighs less than five ounces with batteries, and readily slips into pocket or purse. MSRP is \$89, including S/H in the USA. CA residents please add 8% sales tax.

For further information, contact the Alan Broadband Co., Inc., 93 Arch St., Redwood City CA 94062; 1-888-369-9627; 650-369-9627; [www.zapchecker.com](http://www.zapchecker.com).

## NEVER SAY DIE

*continued from page 7*

eliminating the need for most parts, and with electronic manufacturing now almost all moved to Asia, we no longer have electronic parts stores. Long gone are the days when every ham built stuff. The era of the appliance operator has gradually overtaken us. Electronic experimenting is a vanishing aspect of the hobby.

Gone are *Popular Electronics*, *Byte* and the other hobbyist magazines which didn’t keep up with the times.

For those who enjoy wielding a soldering iron we still have a few kit suppliers such as Ramsey, MFJ and Hamtronics. But, other than that, the ham world has pretty much settled down to depending on Alinco, Yaesu, Icom and Kenwood to build their equipment for them.

So what does this mean for 73? It clearly means either adapt or die. 73’s life or death is more in your hands than mine. Right from the beginning 73 articles were written by the readers, not professional writers. By hams. By guys like you! So sit down at your word processor and process for me.

What can you write about? Lordy! Tell us about the most exciting times you’ve had with the hobby. When you get a new piece of equipment, tell us all what you think of it. How much fun have you had with it? How is it great? What problems have you had? With the few advertisers that have stuck with us we don’t have to worry about making most advertisers angry, that’s for sure.

But I guarantee that every reader wants to know about new gear. They’ll eat it

up. We’re now appliance operators and we want to get the best appliances there are so we can have fun with them.

We also want to know how much fun you’ve had on DXpeditions, or even getting up on a mountaintop and VHF DXing.

How about foxhunting? What equipment have you bought or built for that? Ever had any fun?

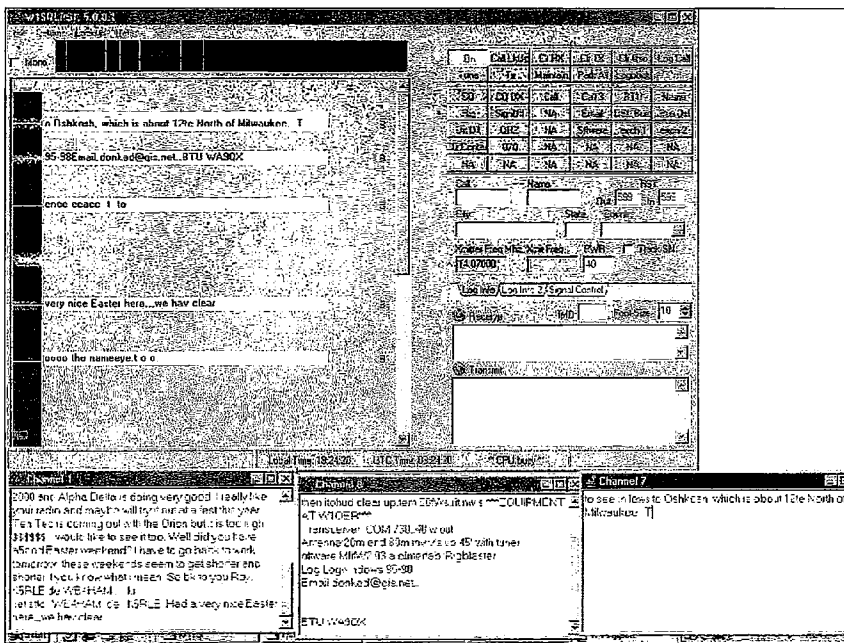
Is anyone other than W7DXX providing Internet access to our bands? How’d ya do it? What does it take? How much fun have your users had?

How about swapping digital photos? How can we best do this? What does it take? I have a digital camera and an iMac, now what do I do?

I’d love to have more Internet info. What clubs have newsletters available?

*Continued on page 59*





**Photo A. WISQLPSK.** Here is the program that has the capability to monitor 20 signals simultaneously. I picked a "slow" time of day for this shot and only selected five traces, then expanded three into their own windows. On the left is the waterfall, dubbed "waterspray." A few of the traces had disappeared by the time I had all this in order to shoot the screenshot. The windows across the bottom are individual text boxes. All four windows can be resized to fit your preference. Across the top is the spectral display good for 4-kHz width. The waterspray at the side can be explored by clicking the bar down the middle so you can see and receive whatever is within the bounds of your filter width. The width is approximately 2 kHz as shown. The lower frequency is at the top. The frequency of the trace you select (none selected for transmit here) is calculated and displayed as the Xmit freq and logged automatically at the end of the QSO. There are 11 predefined macros at the top, and the rest are for you to edit as you choose (instructions included). I used the samples as is and they were just what I needed. The other twist to this software is the ease of callsign lookup and award tracking. (See text.)

## THE DIGITAL PORT

continued from page 47

Web site (see **Table 1**), I saw a note that the database can be purchased on disk, so you do not need to keep your Internet connection up and accessed all the time you are on the air. There is a subscription fee for the continuously on-line database access, but the claim is that it is more cost-effective than purchasing and updating by CD. The information says that the database includes ham calls worldwide and is growing.

In any event, it is another approach to call lookup to get essential information about your contacts as quickly as you can work and log them with this retrieved information. One of the subtle advantages is the award tracking built into the program gives you instant review of your progress. A very nice feature for many hams.

I have been using computer logging for several years now, and it just seems to be a part of operating once you start using it. Yet,

I am still running across hams who are using pencil and pad. There is an advantage to hard copy as you will read a little later in this column, but there is no way to get the instant lookup nor the ease of recording afforded by the many ham programs available today. This program is another example of good logging with a slightly different slant that stands on its own merits.

The program can be downloaded, as freeware and fully functional, from [www.faria.net/w/sql/] (new in The Chart). It is several megabytes and I was glad, at least this once, that it comes in three floppy-size files so I could transport it handily from one computer to another. I found a Help file on the Web site and, not being certain if that meant the Help was separate, I printed that one.

You need the Help file to get around some of the new stuff you will see, and it is only eleven pages, but when I got the program installed there was a more up-to-date file already installed with the program. Take a

look. It is an experience worth taking just to see another ham's view of how to play this digital game.

## Other news

Quite a few of you write with various success stories as well as requests. It gives a lot of satisfaction to see the interest you express in the digital modes. I think these modes are the leading reason for renewed activity from hams who fell into inactivity a few years back. At least that is how I read the messages I receive on paper (includes E-mail, snail mail) and over the air and even phone calls.

I have spent some time these past several weeks with computer failure, and have managed to get some old stuff back together while I sort out a hardware problem with the latest machine. So I have busied myself with a new combination.

The only real difference today is that I have the Windows 98 operating system plugged into the old "slow" 120 MHz machine and it is really jumping through the hoops in a true form of excellence. That is compared to the performance experienced while using the fabled Millennium Edition (Me) of Windows that had been giving me fits for the past six months.

The Me experience is behind me, but there were a few pitfalls along the way. After many frustrations, I decided to take advantage of the kind offer of a Windows 98 installation disk provided by another ham. Things just had to improve. The installation process went well. Took more time than I anticipated, but things were really looking great after many pieces of software and drivers were installed. This was going to be the best of all worlds.

## Ka-blooeey

Disaster (Murphy?) struck. About the third day into the exercise, the hardware died. Seemingly never to open its little eyes again. After weighing various alternatives (including basket-weaving and whittling), I set that computer aside until my cooler side could approach the problem.

That was when the resurrection of the old 120 MHz machine began in earnest. It is doing well if I simply disregard a few quirks for the moment. That is, the ham programs are functioning better than under Me and the log files that corrupted during the transfers between systems are nearly restored.

The important things are in place. Of interest to some of you, the Creative Sound SB-16 soundcard is far and away a better performer than the up-to-the-minute super-



duper model, also built by Creative, that was furnished in the new quick-as-a-fox computer lying here in failed mode.

These cards are all supposed to be compatible, especially from Creative, but the old one plays music and drives the speakers as it should and, more importantly, there is no need to set the receive/transmit frequencies offset from each other so as to be on frequency with the other station. Just couldn't get those two things to work properly with the later version.

At the moment, I do not have the Internet connection solved with this new setup, so I am having to transfer files between computers that have to go to and from the Internet. Also, I failed to mention some incompatibility of files burned into a CD that only read on one of the computers in the shack. Must be some of Murphy's selective bugs.

So, at this writing, the only ham software installed, prior to the W1SQLPSK installation, was the MixW2 which, in its downloaded form, fit on a floppy and was transportable by that method. There are other skinny programs such as that which will be easily moved into place.

Of course, the answer to all this should be to get the new machine up and running. One of the reasons for continuing with this slow-machine project is that I believe there are a lot of hams who own or have available some of the older, slower machines. It is good to be able to say you can have an enormous amount of fun with something like this and not have to break the bank to get all the newest and coolest hardware.

And, if I am telling you anything of value here, it is that some of these combos will flat out-perform the new machines. Sure proved it to me when I got this on the air with the Win98 operating system.

What I am saying is simply that my preference is Windows 98. I know there are programmers who are taking advantage of some of the new platforms, but there is a downside. Some of the other programmers who have furnished excellent software for Win95 and 98 are digging in their heels and not making the old software run on the new platforms, and this means that for some of us, we have to make a choice.

I am perfectly satisfied with what I see in front of me, at least as far as Windows goes. There is more to the operating system story. For one thing, Windows is never going to quit building the "new and improved" systems. They have two more on the drawing boards at the last count. The purpose? Beats me. I am glad I am not a programmer who has to put up with all that nonsense.

Source for:	Web address (URL):
Mix W2 Soundcard program for PSK31, RTTY, new modes, MTTY, FSK31, more	<a href="http://lav.kiev.ua/~nick/mixw2/www.nvbb.net/~jaffejim/mixwpage.htm">http://lav.kiev.ua/~nick/mixw2/www.nvbb.net/~jaffejim/mixwpage.htm</a>
FREE MMHam site — MMTTY — MMSSTV	<a href="http://www.qsl.net/mmhamsoft/">www.qsl.net/mmhamsoft/</a>
FREE VK7AAB — SSTV-PAL — PSK-PAL	<a href="http://users.origin.net.au/~crac/">http://users.origin.net.au/~crac/</a>
Much ham info w/SSTV downloads	<a href="http://www.conknet.com/~kb1hj/index.htm">www.conknet.com/~kb1hj/index.htm</a>
TrueTTY — Sound card RTTY w/ PSK31	<a href="http://www.dxsoft.com/milrtty.htm">www.dxsoft.com/milrtty.htm</a>
Pasokon SSTV programs & hardware	<a href="http://www.ultranet.com/~sstv/lite.html">www.ultranet.com/~sstv/lite.html</a>
PSK31 — Free — and much PSK info	<a href="http://aintel.bi.edu/es/psk31.html">http://aintel.bi.edu/es/psk31.html</a>
Interface for digital - rigs to computers	<a href="http://www.westmountainradio.com/">www.westmountainradio.com/</a>
Soundcard interface info — includes Alinco	<a href="http://www.packetradio.com/psk31.htm">www.packetradio.com/psk31.htm</a>
Interface info for DIY digital hams	<a href="http://www.qsl.net/wm2u/interface.html">www.qsl.net/wm2u/interface.html</a>
WinWarbler info and DXLab suite	<a href="http://www.qsl.net/winwarbler/">www.qsl.net/winwarbler/</a>
MFSK-related tech info — how it works	<a href="http://www.qsl.net/z11bpu/">www.qsl.net/z11bpu/</a>
Throb — lots of info	<a href="http://www.lsear.freeseerve.co.uk/">www.lsear.freeseerve.co.uk/</a>
Download Logger, also Zakanaka	<a href="http://www.qsl.net/ko4elo/">www.qsl.net/ko4elo/</a>
PSKGNR — Front end for PSK31	<a href="http://www.al-williams.com/wd5gnr/pskgnr.htm">www.al-williams.com/wd5gnr/pskgnr.htm</a>
Digipan — PSK31 — easy to use	<a href="http://www.digipan.net/">www.digipan.net/</a>
TAPR — Lots of info	<a href="http://www.tapr.org">www.tapr.org</a>
TNC to radio wiring help	<a href="http://freeweb.pdq.net/medcalf/ztx/">http://freeweb.pdq.net/medcalf/ztx/</a>
ChromaPIX and ChromaSound DSP software	<a href="http://www.siliconpixels.com">www.siliconpixels.com</a>
Creative Services Software, multimode with PSK	<a href="http://www.cssincorp.com/products.htm">www.cssincorp.com/products.htm</a>
Timewave DSP & AEA (prev.) products	<a href="http://www.timewave.com">www.timewave.com</a>
Auto tuner and other kits	<a href="http://www.ldgelectronics.com">www.ldgelectronics.com</a>
RCKRtty Windows program with free DL	<a href="http://www.rckrtty.de/">http://www.rckrtty.de/</a>
SV2AGW free Win95 programs	<a href="http://www.raag.org/index1.htm">www.raag.org/index1.htm</a>
Source for BayPac BP-2M & APRS	<a href="http://www.tigertronics.com/">www.tigertronics.com/</a>
Int'l Visual Communication Assn. — nonprofit org. dedicated to SSTV	<a href="http://www.mindspring.com/~sstv/">www.mindspring.com/~sstv/</a>
Hellschreiber & MT63 & MFSK16 (Stream)	<a href="http://iz8bly.sysonline.it">http://iz8bly.sysonline.it</a>
HamScope — multimode w/ MFSK16	<a href="http://users.mesatop.com/~ghansen/">http://users.mesatop.com/~ghansen/</a>
YPLog shareware log — rig control — free demo	<a href="http://www.nucleus.com/~field/">www.nucleus.com/~field/</a>
WinLink 2000 system info	<a href="http://www.winlink.org/k4cjp/">www.winlink.org/k4cjp/</a>
Another GREAT Web resource	<a href="http://www.g3vip.com/">www.g3vip.com/</a>
Airmail — free program to use WinLink 2000	<a href="http://www.airmail2000.com/">www.airmail2000.com/</a>
WinPSKse — PSK31 freeware	<a href="http://www.winpskse.com/">www.winpskse.com/</a>
W1SQLPSK multisignal (up to 20) decode	<a href="http://www.faria.net/w1sql/">www.faria.net/w1sql/</a>
The CHART now on the Web	<a href="http://www.geocities.com/normandy214/ham_radio.htm">www.geocities.com/normandy214/ham_radio.htm</a>

Table 1. The Infamous Chart.

## Linux ... progress?

One of the reasons I had to overcome some unwanted problems with this old machine (other than the fact it is just plain ... old) is that I had been experimenting with what appears to be the best alternative to all this Windows hype. That is, the Linux operating system.

I still am at a loss on that one, but I am slowly getting smarter. At this point, I cannot recommend someone with no Linux experience, such as I, jumping into the system to get going in digital ham fun activities. Linux has a steep learning curve.

Continued on page 58



# Techniques Time Line

*How much do YOU know about the evolution of construction practices?*

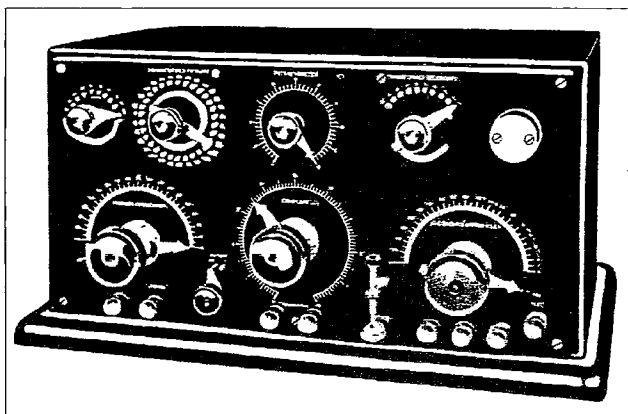
*As a ham, do you recall the evolution of the electronic construction practices that have taken place over the years? Much of it was done by ham experimenters, and the resulting advancements have been incorporated into modern equipment.*

**H**am radio really began when an experimenter started many years back with the construction of a "radio"-type project. Perhaps, in the beginning, those experimenters weren't referred to as "hams," but eventually they were so designated to separate the stigma between commercial- and amateur-type activities, but even with commercial enterprises on the uprise during the early years, hams were the inventors, designers, builders, and producers of radio products and technology. Hams can be proud of

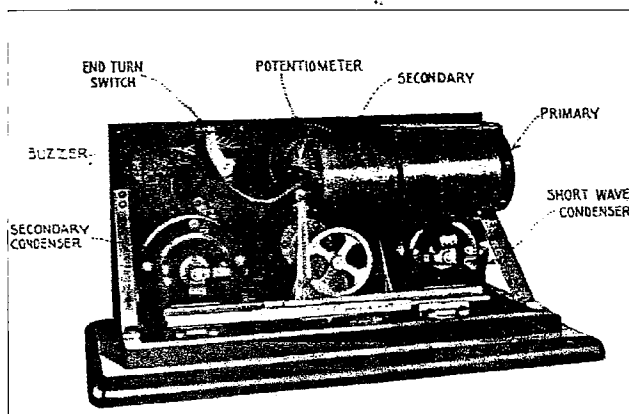
their contributions to the advancement of electronic technology over the preceding years regardless of the end usage. World War II is essentially the dividing line in technological development, where a separation in the identity of ham versus commercial contributions began to shape up even though hams continued to be the primary technical contributors.

Just for the fun of seeing the evolution of construction practices, I've pulled together a number of photographs dating from about 1918. **Photo**

A shows the construction of a Marconi Model 106 receiver. In looking at the panel very carefully, one will observe that all of the circuit elements have been brought out to the front panel, enabling the operator to have full control over the circuit's characteristics. As a detector, Marconi used a carborundum crystal. But to function as a rectifier, a small amount of battery bias was applied to the crystal for best sensitivity. **Photo B**, though not very clear, shows the internal mechanical mechanisms that were used to control the circuit

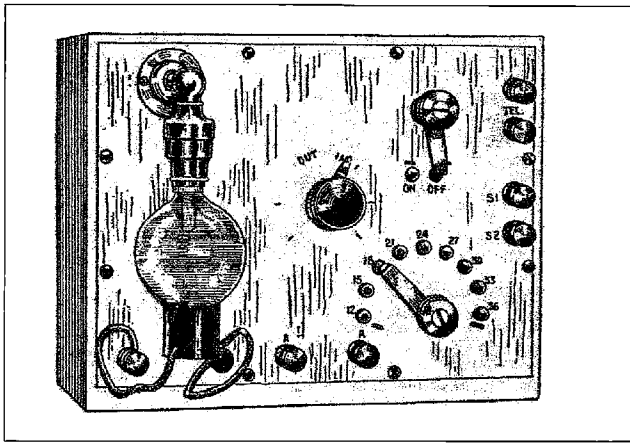


**Photo A.** Front panel view of a circa-1918 Marconi Model 106 receiver. Frequency range was 86 kHz–1.5 MHz. Photo ref. 1, pg. 15.

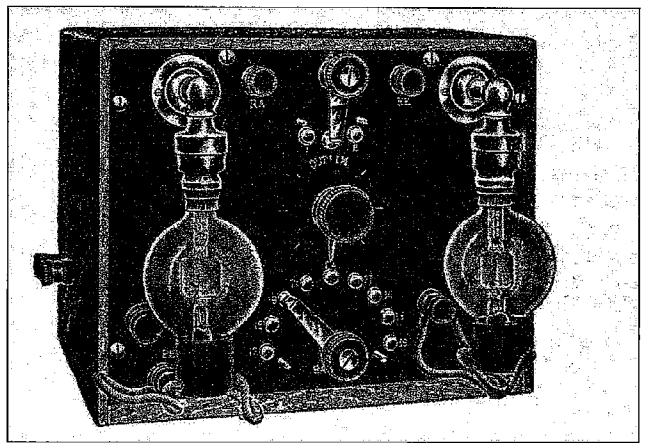


**Photo B.** Rear view of a Marconi Model 106 receiver. Note the use of heavy mechanical parts used for controlling circuit elements. Photo ref. 1, pg. 15.





**Photo C.** Front panel view of a 1920s-era amateur-type audion amplifier. This device functioned as an untuned RF amplifier. Photo ref. 2, pg. 2333.



**Photo D.** Front panel view of a professional-type audion detector. This type of detector was used by both the U.S. Army and Navy. Photo ref. 2, pg. 2332.

elements. Take note that mechanics took a dominant roll in electronic construction during the early years. The tuning range of the Marconi 106 receiver was from about 86 kHz to 1.53 MHz, where the upper frequency end of the range was considered "shortwave."

If you look closely at the upper right-hand corner of the receiver shown in **Photo A**, you'll see a round object. That object is a buzzer that was an integral part of early receiving equipment utilizing point contact detectors. When using a point contact detector regardless of the base material used, the catwhisker had to be placed such that the junction created a rectifier. To determine the placement and sensitivity of the junction, a buzzer was used to create an RF noise that allowed the operator to adjust the catwhisker for the highest level of detected noise.

Although the Marconi 106 receiver was produced as a commercial venture,

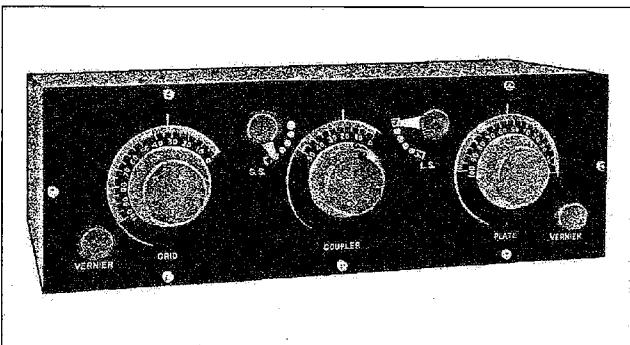
the construction techniques and layout provided some guidance to the construction of later equipment. **Photo C** shows an amateur type of audion "amplifier" that was developed during the 1920s era. Although it isn't a detector as we think of one today, it amplified the noise and noise amplitude variations that occurred at the antenna. Such an amplifier was used as an amateur CW receiver both with and without an additional detector. The tube used as the "amplifier" element was a triode. The tap switch mounted on the front panel changed the transformer turns ratio between the primary and secondary windings of the RF transformer. Circuit resonance was done only in the antenna input circuit.

A commercial version following the amateur concept was built utilizing one tube as an amplifier and the other as a detector (see **Photo D**). Again, the circuits were only roughly resonated

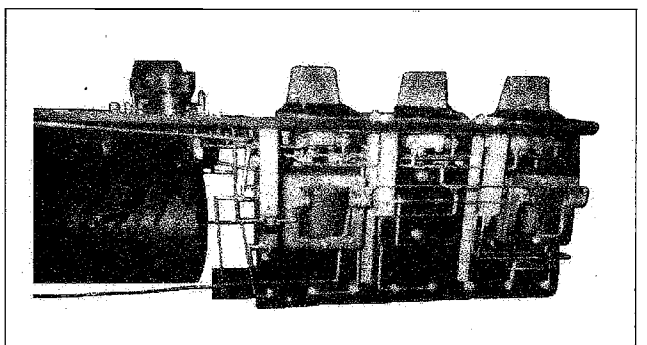
and were dependent upon signal energy coupled by an input transformer.

Note that the construction techniques used in the latter two circuits follow the construction practice established by Marconi design practice. All of the circuit elements are terminated on the front panel for full operator control.

Following the experiments and developments provided by Edwin Armstrong, and particularly the regenerative detector, receiver development took a large surge forward as shown in **Photo E**. Notice that the construction technique of bringing out circuit elements still existed in 1923, when the panel began to take on a slightly more modern appearance. Although the concept of circuit resonance was developing, the circuits used as late as 1923 were only beginning to show a need for resonance. The large knobs on the front panel controlled two variometers

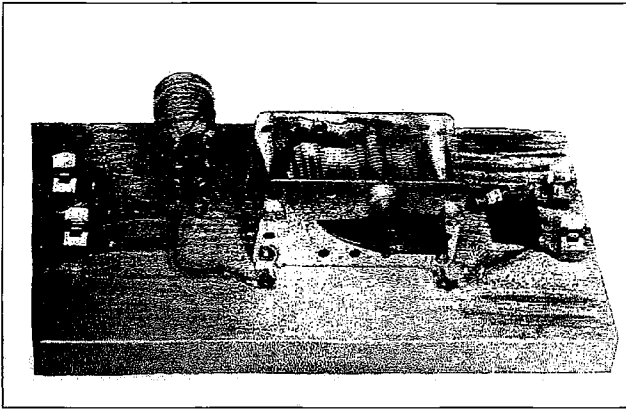


**Photo E.** Front panel view of an Armstrong-style regenerative receiver. Knobs controlled variometers and feedback coupling. Photo ref. 3, pg. 152.

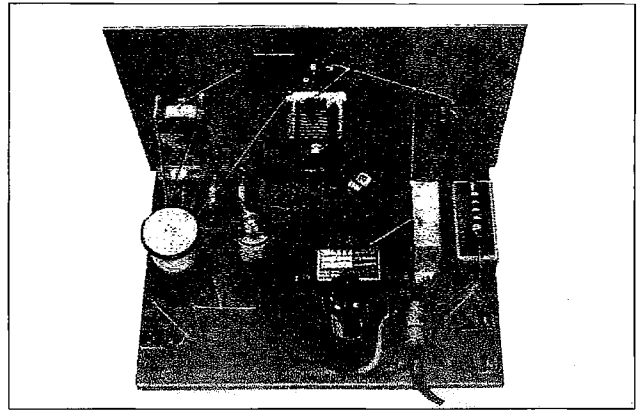


**Photo F.** Construction technique of routing bare wire between connect points. Heavy-gauge wire was used to maintain mechanical separation and support.





**Photo G.** Breadboard layout of an amateur-built diode detector. This form of construction elicited the name "breadboard" for experimental circuit development. Photo ref. 4, pg. 27.



**Photo H.** Breadboard layout with a metal panel for an Armstrong regenerative radio. Note the direct/straight wiring technique used. Photo ref. 5, pg. 12.

and one variable capacitor. Coupling between the variometers controlled the regenerative feedback.

Wiring of circuits utilized heavy bare copper wire. The wire was made heavy in order for it to "fly" without support between tie points. Component mounting was against a panel without the use of a chassis. **Photo F** shows an example of an early piece of equipment using the heavy "flying" wiring technique. Routing of the heavy wire was critical only to the extent that wires would not touch regardless of normal equipment handling.

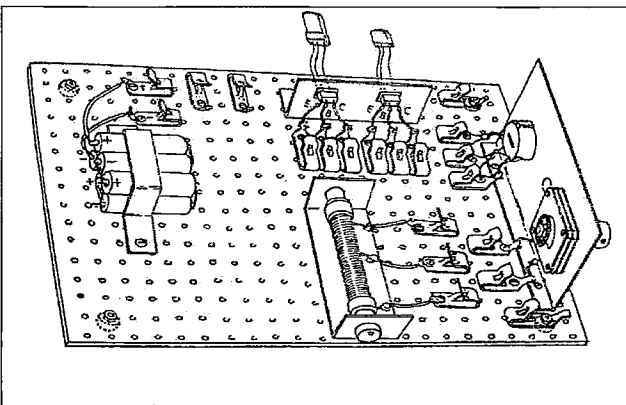
Mechanical practices continued to evolve with the passage of time, and most construction techniques practiced by hams produced equipment for personal use. As a result, emphasis on professional appearance was traded for ease of construction and circuit function. Although the detector circuit

shown in **Photo G** is quite recent, it represents the use of wood as a "chassis" for the circuit as was used earlier. The word "breadboard" as we use it today developed from the use of wood products in the construction of experimental and ham electronic projects. Many commercial radios evolved out of the 1920s era with electronic components mounted on a wooden base. Some of the radios utilizing a wooden base had grooves cut into the bottom of the board. Wires were routed along in the grooves to provide mechanical stability and to keep the wires from touching. One might consider the practice as an early "wiring board" which we now refer to as a printed circuit board (also known as a printed wiring board).

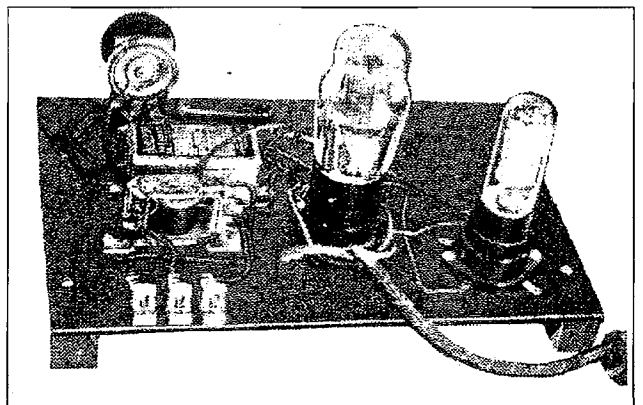
The next step in wiring from the grooved technique was the use of square wire routed in a relatively

square layout on the topside of the wiring board. The rigidity of the wire was important to keep the wires from flopping around and touching other circuits. **Photo H** shows a modern approach to the rigid wiring technique.

Keep in mind that the purpose of the chassis, whether wood or any other material, is to keep all of the parts "flying in formation." With that in mind, hams have tried a wide variety of construction techniques as technology has evolved. Although I don't have a chronological order for the following photographs, they do show some of the techniques that hams have used. In fact, hams continue to utilize the "breadboard" approach as is shown in **Photo I**. Perforated board has been a simple solution for the ham experimenter because it allows for flexibility in circuit development. In this example, Fahnstock clips allowed for a wide

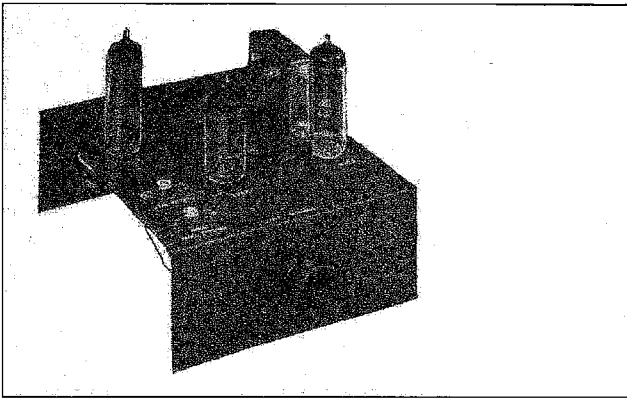


**Photo I.** Use of a perforated board for mounting components. Note that circuit designs can be varied by sliding wires into the appropriate Fahnstock clip. Photo ref. 4, pg. 161.

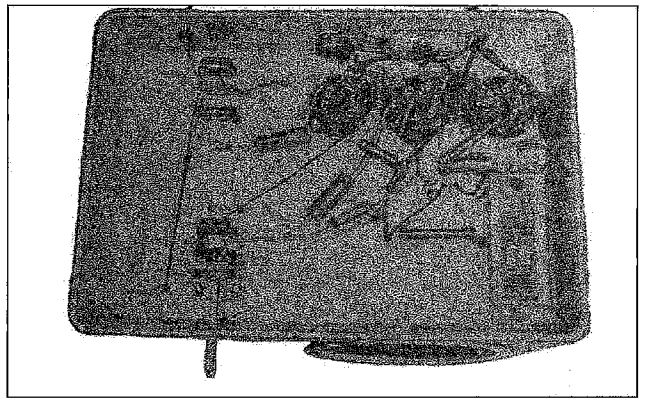


**Photo J.** Note the use of phenolic or Masonite board supported by wooden strips. Experimentation is made easy using the technique of open space and direct wiring.





**Photo K.** This project was built on a piece of sheet metal bent into the shape of a letter "U". Open construction allows for easy wiring and the metal provided an early measure of RF shielding. Photo ref. 4, pg. 47.



**Photo L.** Aluminum bread pan or cake tin. The rolled edge is safe to handle during construction. In addition, the rolled edge and tapered sides provide rigid support for the project. Photo ref. 5, pg. 18.

variety of experimental circuits utilizing one board and one set of components.

Getting back to the wooden construction technique, **Photo J** shows how a thin board is screwed down to a set of wooden runners. This technique allowed components to be mounted on both sides of the thin board. Circuit wiring has evolved at this point in time with insulated wire so that direct wire routing is possible. A direct wiring technique works most of the time, but as frequencies supported by the project rise, wire routing becomes very critical.

Following WWII, sheet aluminum became readily available to the amateur community. Being a soft material, its use in ham construction projects took a sharp rise. **Photo K** shows one of the early construction techniques where the metal was bent into the shape of a "U". You'll notice that the shape follows the technique shown in

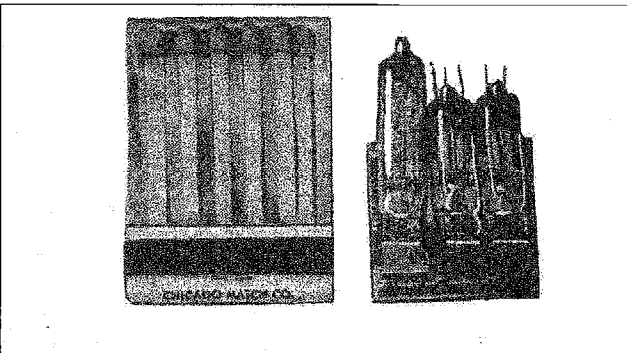
**Photo J**, where the turned down metal ends are used as a support,

My all-time favorite construction technique utilizes an aluminum pie or bread tin. Yes, many iron/steel/aluminum pans were available following WWII, with the aluminum ones being the easiest to work. One example of ham construction on an aluminum pan is shown in **Photo L**. The great advantage of bread pans was that they were available at the local grocery and "Five and Dime" stores at a price even a kid could afford. If you haven't built an electronic project on a "pan," I recommend that you consider doing so. The pleasure of the project, simplicity, and low cost are very rewarding. Besides, the project will most likely work the first time it is powered up.

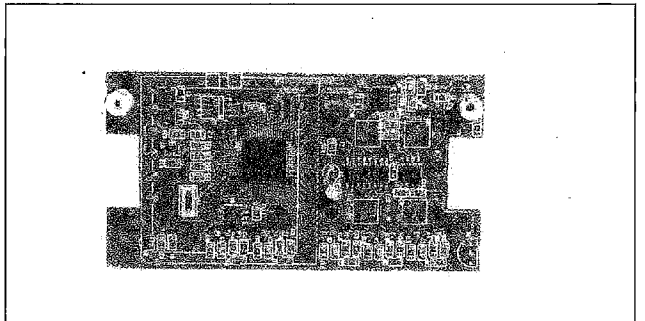
With the evolution of semiconductors and printed circuit boards, tubes continued to be used for some time. With the "push" toward miniaturization, tubes were decreased in size to meet

the need. It wasn't much of a surprise to see small tubes mounted on circuit board material as shown in **Photo M**. During the transition period, tubes were more reliable and met existing circuit designs, and continued to be used in critical applications. The use of transistors created a sharp rise in circuit development supporting semiconductor technology.

As semiconductor reliability and complex circuit integration increased at a rapid pace with the usage of printed circuit boards, construction techniques continued to advance along with electronic technology. **Photo N** shows a typical board populated with modern components. Circuit trace lines were pushed ever closer together in support of higher component density. Take note that bare circuit traces have taken on the appearance of the historic heavy-gauge wire (refer to **Photo F**). If it weren't for the circuit board, the traces would be "flying"



**Photo M.** Miniature tubes mounted on a printed circuit board. Photo ref. 6, pg. 174.



**Photo N.** This is an example of a modern printed circuit board using LSI technology where the wiring is "flying in formation" as was used during very early circuit construction.



freely in the air. Allowing one's imagination to wander, one might see construction history repeat itself as time continues, but new developments will support the latest technology.

## Conclusion

As large-scale integration continues to advance, reliance upon mechanical structure will increase rather than decrease. History will repeat itself when it comes to construction practices, but perhaps at a more sophisticated technology level.

After reviewing the photos of the various construction techniques, please note that very little has changed over the years. Yes, the packaging methods have evolved and shifted to meet an appeal. Wiring techniques have evolved to "fit" the situation, but every mounting structure in existence today still has as its sole purpose keeping the parts and wires "flying in formation."

Keep 'em flying, and 73!

## Photo references

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## LETTERS

*continued from page 8*

to his exposure on "Coast to Coast AM" 73 is regaining the stature it once had, and the "grim reaper" of ham radio publishing will have to wait once again.

*Gee, Bill, didn't know you were looking for work. But seriously, thanks for putting several of us in the hospital with dislocated*

*shoulders and arms from patting ourselves so hard on the back. Immodest? I hope nobody ever accuses us of that!*

*But really seriously, just as we thank you for your kind words (not to mention your immense contributions to amateur radio through your "Looking West" column, Westlink Report, Young Ham of the Year, Amateur Radio Newslite, and who knows how many other things), we print this letter only as a means to point out a few things and make a pledge to our readers.*

*First of all, it is true that 73 would not be in existence if there had not been El Supremo. And it is certainly fair to say that Wayne's spirit infuses 73 and directly drives his editorials.*

*But as I have always heard Wayne say since I first walked through these doors 27 years ago, 73 is not about Wayne. It is about you, the reader, the average ham in the street, the everyday radio amateur from Oshkosh to Oslo, from New York to New South Wales, from Mexico to Murmansk.*

*We are not some big organization with agendas and axes to grind (or to not grind, as the case may be). We are not for the rich and the niche. We are — as the saying goes — of the hams, for the hams, and by the hams, and we intend to stay that way. Promise.*

*So keep those letters, cards, articles, photos, and whatever coming in — we love 'em and do pay attention to them all.*

*And thanks again, Bill, for thinking of us. — J.B.*

**Arne N6XNA.** Over the years since I started in amateur radio 43 years ago, I have found your publications very easy to understand, well written, and right to the point! I hope you continue with them for years to come! Thanks again and keep up the great work! 73

## Restoring an HQ-140-X — Part II

*continued from page 30*

both the 40- and 20-meter bands, the receiver was hearing stations comparably well against the solid-state radio.

A signal sensitivity test between the Hammarlund HQ-140-X and the solid-state radio was about 4:1 better for the solid-state, but with each listening to the same station and evaluating by ear, the 4:1 in sensitivity difference between the receivers was hardly discernible.

Having the opportunity of working with my Hammarlund HQ-140-X once more brought back a lot of nostalgia. Although I may never "need" the receiver as part of my station, just knowing that it is healthy and ready to operate gives me a very warm feeling.

NOSTALGIA!! What a powerful tool!

## Manual references

If you are in need of a manual for your receiver, try these sites:

- [\[http://bama.sbc.edu/hammarlund.htm\]](http://bama.sbc.edu/hammarlund.htm)
- [\[http://www.radioprints.com\]](http://www.radioprints.com) 73

## Travels with Henryk — Part 5

*continued from page 32*

While leaving Trondheim, I noticed a tower with quite a large HF array (**Photo G**), but the owner, Esgil LA9MB, was abroad then so I could not meet him.

The Norwegian landscape is amazing north of Trondheim. I was lucky to have good weather most of the time. The country is both green and populated even north of the Arctic Circle. Passing Narvik, an important harbor town, I could not avoid seeing a very lovely radio shack with a nice antenna. The local radio club, LAIN, has its station here (**Photo H**), but (of course) nobody was there.

Next time, I'll have to prepare myself better and try to meet more of Norway's 7,000 hams! 73

## Icom Interface, Texas-Style

*continued from page 35*

One thing bothered me. I was always used to monitoring my signal, but the Icom has no internal monitor. You can't tell what you are sending, and if you are new with these modes you have no idea what the signals are supposed to sound like. Sometimes and for some unknown reason, transmitting stops, and if you are watching your keyboard you type away, and when you sign you suddenly discover you were not transmitting, and lo and behold you have lost your contact.



It was then that I decided to build my interface to monitor my signals. At first glance, the interface circuit looks like the conventional type. With a few simple additional parts, I was able to not only monitor my signals but also be able to switch to either the Accessory input or the Mic VOX circuit. This comes in handy for some programs, and although you can use it on any of the programs, some, like BTL RTTY, use VOX only. The circuit is self-explanatory with a few exceptions. All of the parts can be purchased from Radio Shack if you don't have them in your junk box. But I have to emphasize one thing — to use the monitoring, you must have amplified speakers — the conventional non-amplified speaker does not work. However, I think they can be made to work by replacing R3 with a low-resistance volume control.

Now, the only thing I will mention about the circuit is to be sure to connect the A, B, and C shields to the #2 pin on the ACC Din plug. Other than that, just follow the circuit. 73

## Windowsill Mount for Verticals

*continued from page 36*

first to protect it from the elements. Wood will absorb moisture rather rapidly, and will swell and break off where the window is pressing down upon it. In both cases, I would make the board approximately 6 inches or more in width, and to not exceed an outside length of 2 feet.

For the angle brackets, I would use a tempered metal, perhaps 1/8-inch steel or aluminum, long enough to be able to straddle the windowsill for proper support and able to take the strain pressure of the clamp. In most cases, the window pressure upon the board will suffice to hold it in place, but don't take chances, and employ an insulated safety line on the antenna. This is especially important if you are located 15 stories above the street, which was my case. I wanted to ensure that the board and antenna would not have an encounter with a citizen walking below.

The coax is run adjacent to the board. The gap between the sill and window can be filled in with styrofoam or such.

Have fun, and work some DX this year! 73

## ON THE GO

*continued from page 39*

of the newspaper or the lead story on the evening news. Start small. Write a short story to be included on the "mytown.com" (or whatever your city calls it) Web page. See if the local cable company is interested in a public service announcement. Do a display at the local library. Don't promote how great we are, but instead how much we can and will help.

f. Find other groups with similar interests. We've done pretty good with the Red Cross and other such groups, but there are others. Is there a Police Department or Sheriff's Reserve? What about the state militia? This is not the National Guard but a state operated "home guard" that many states operate and does not have a federal role. Some states refer to this as the "Military Reserve"; they may be called upon to provide certain services, but probably do not have communications resources. (Haven't heard of the state militia? Hmmm. Maybe they have something in common with us!)

If people don't know we exist, we have no value to them. If they know what we can do and are counting on us, then we have real value. Our value is due to how our neighbors perceive us, not how we perceive ourselves. It's a buyers' market, and if our communities and neighbors see our value, then our role (and our frequencies) will be too valuable to use for something else.

Let me know what you are doing to show the value of our hobby. 73

## HAMSATS

*continued from page 41*

g. The use of more than one transmitter at the same time on a single satellite transponder is prohibited.

### 2. Digital Transponders.

a. For the Pacsats (LO-19, UO-22, etc.), each satellite is considered a separate band. Do not post "CQ" messages. Simply upload ONE greeting message to each satellite and download as many greeting messages as possible from each satellite. The subject of

the uploaded file should be posted as Field Day Greetings, addressed to ALL. The purpose of this portion of the competition is to demonstrate digital satellite communications to other Field Day participants and observers.

The following uploads and downloads count as three-point digital contacts.

a. Upload of a satellite Field Day Greetings file (one per satellite).

b. Download of Satellite Field Day Greetings files posted by other stations. Downloads of non-Field Day files or messages not addressed to ALL are not to be counted for the event. Save DIR listings and message files for later "proof of contact."

c. Satellite digipeat QSOs and APRS short-message contacts are worth three points each, but must be complete verified two-way exchanges. Remember, only one digipeat contact is allowed for the ISS, and one for PCSat (NO-44).

d. The use of terrestrial gateway stations to uplink/downlink is not allowed.

e. If FO-29 is active, the JA transponder can be used for analog CW and phone activities under the analog transponder rules, and the JD system can be used as a separate transponder under the digital rules.

## Sample Satellite Field Day Greetings file

Greetings from K5OE Field Day Satellite station near Katy, Texas, with 22 participants, operating class 2A, in the AMSAT-Houston group with the Houston Amateur Television Society and the Houston QRP group. All the best and 73!

Note that the message stated the call, name of the group, operating class, where they were located (the grid square would be helpful) and how many operators were in attendance.

### 3. Operating Class.

a. Stations operating portable and using emergency power (as per ARRL Field Day rules) are in a separate operating class from those at home connected to commercial power. On the report form simply check off Emergency or Commercial for the Power Source and be sure to specify your ARRL operating class (2A, 1C, etc.).

b. The Satellite Summary Sheet (AMSAT Web site) should be used for submittal of the AMSAT Field Day competition results to Bruce Paige KK5DO, Vice President User Services, P.O. Box 310, Alief, TX 77410-0310. Make sure to also send your Field Day photographs with your submission! The deadline for submissions is August 1, 2002. You



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can also send your entry sheet electronically to [kk5do@amsat.org].

c. If your score is in the top five, you will be requested to submit dupe sheets for the analog contacts and DIR listings and downlinked files for the digital contacts.

## ABOVE & BEYOND

*continued from page 43*

on my unit I provided for a take-off from the 1/2 synthesizer frequency on the divide-by-2 chip, U4 a UPB584 IC pin #7. This normally is coupled through a 330 pF chip capacitor to the synthesizer input U2, a 3036 IC, pin # 28. I coupled out of this spot (U4, pin #7) on the PC board with a 5 to 10 pF chip capacitor to the IF amplifier input with a short section of >.085 copper hard line.

The half frequency of 2592 MHz is 1296 MHz and is used for calibration at this spot frequency for 1296 MHz operations. It's a natural as long as it can be obtained so easily for such little effort. All that is required is to connect to a small amplifier to increase this low power level feeding pin #28 of the 3036 synthesizer chip. The amplifier I used here is a Qualcomm transmit IF amplifier normally used for the 1 GHz IF. Bandpass on this IF amplifier is sufficient to allow operation from 800 MHz up to about 1600 MHz without retuning, making it a simple amplifier to use at 1296 MHz.

The entire package can be constructed into a BUD box, or you could construct one out of double-sided copper circuit board. Solder sections to form a box for the PC boards fitted with coax connectors and power feedthrough capacitors for DC connections. An alternate construction method is to use strips of copper or hobby brass 1/2- to 3/4-inch wide to solder to ground foil edge of the amplifier multiplier PC boards.

Well, there you go. That's all for this month. Next time, I hope to get into describing a 1296 MHz power amplifier module that can be converted from available surplus material. On the back burner is further involvement with continuing this marker project to develop keying CW ID and amplification for a beacon package. Don't know if it will all come to pass but I am trying to put the total system together using available material. If you have any questions about this or other items, drop me an E-mail at [clhough@pacbell.net]. Multiplier PC boards are available from me at \$20 each plus postage of \$3, California residents, please add sales tax. Further information is posted on the Web page for the SBMS at

[http://www.ham-radio.com/sbms/]. Look under technical papers from the San Diego Microwave Group.

## THE DIGITAL PORT

*continued from page 51*

One of these days, I fully intend to get enough of that steep business behind me to the point I can report to you that it does work. In the meantime, I will just keep teasing you with bits and pieces of how it is going. As yet, I surely will not promise I can ever make it sound easy. It is simply my challenge.

### Good stuff lasts

Just another little aside. I was looking at this ancient keyboard I bought sometime in the eighties and realized how you tell if you get a good one. If you are like me, you have thrown away a number of cheap, failed keyboards after maybe a year or so, and if that is the case, you never see what I am looking at. This keyboard has the identifying letters worn off the keys used to carry the letters "E, T, A, R, I, S, H, N, U and O." All the most popular letters in the English language have proved their popularity on this old keyboard that just "keeps on tickin'."

That is the way I would like to see software. Many hams are not aware of a nifty soundcard communications package called RITTY. This is a DOS program that deserves a bit of attention. I have never devoted time to it, though I did download a demo copy once. It was hard to put it through its paces in the demo version, because it would only run for a few minutes — just about long enough to set the parameters and tune a signal.

However, I have worked hams who swear by it on RTTY. There are some advantages to writing such software for DOS rather than Windows, in that the Windows overhead, when not running, frees up a lot of the computer for the really important things programs are meant to do.

That's it for this month. Hang in there and keep the airwaves buzzin' digital. Let me know if I can help. 73, Jack KB7NO.

## Your Ad Could Be Here!

call

Frances

1-800-677-8838



## NEVER SAY DIE

continued from page 48

Where can I shop for used ham gear? Any sites for DXpedition info?

If you get me excited about what's doing on six meters or Web sites I should be visiting, I might not keep ragging the readers with great big, fat, constipated guts hanging over their belts about changing their diets and adding 30 or so healthy years to their lives.

How can you get your gems to 73? Easy. E-mail to [design73@aol.com]. If you have nondigital photos, then send your article, photos, and a disk copy of the text to 73 Magazine, 70 Hancock Road, Peterborough NH 03458. Any questions? Call Joyce at 603-924-0073.

Your stories of the fun and excitement ham radio has provided you will not only make 73 more interesting, it'll give me material for a booklet clubs can give to youngsters to get them off the streets or out of their PCs. We need to have stuff like that so we can get kids interested in hamming. We have to either advertise and promote the hobby or it'll blow away.

One more thing. We've got around a half a million inactive hams. How about your ham club investing in a phone ROM and getting the members to get on the phone, call the hams in the area, find out why they're not active, and then let me know. Oh, also ask them what it would take in a ham magazine to get them to subscribe. I really need to know that! In addition to getting a lot of valuable information, you just might be able to get some of these guys to come to club meetings. That's if you have interesting meetings ... you know, like having me give a talk via a phone amplifier.

### The Hep-C Generation

Have you built or bought a blood purifier yet? You, your family and your friends all sure could use one.

An E-mail from a chap in Florida reminded me to get on your case. After a year's medical treatment for hepatitis-C, with no success, he was scheduled for a second year. Instead, he used the blood purifier two hours a day for a month and then, when his doctor tested him, his blood was completely free of hepatitis.

If one of the generous billionaires who are sending drugs to Africa to help fight Hep-C, malaria and AIDS would send a few thousand blood purifiers instead of drugs, a more serious effort could be made toward cleaning up the miseries these and other blood-carried diseases (like bilharziasis) are causing.

Mass production in China could get the cost down to under \$10 a unit. We've

got very nice wristwatches selling for a buck, perfectly good telephones for \$5, great little radios for \$5, and cassette players with earphones for \$10, so we're seeing how cheap it's possible to mass produce electronics.

Also, when we're dealing in prescription drugs it is wise to remember that they are the fourth leading cause of death in America.

Of course, if we could convince people to stop putting toxic crapola in their bodies there wouldn't be any need for drugs or blood purifiers.

### The Savage Breast

Yep, here I go again, hoping I can get you to share the joy I get from music.

Some pieces of music bring back memories. Listening to *España* by Chabrier reminds me of the many hours I spent in the San Francisco USO during WWII, playing this record in their music listening room. This was during the six months I spent on Treasure Island at the Radio Materiel School, one of the happiest school experiences of my life. I loved learning about electronics, radio, sonar and radar. I ate it up.

I never forget the first time I heard Beethoven's *Sixth (Pastorale) Symphony*. I rushed downtown, bought the album and then sat in my fraternity house living room with my ears right up against the speaker, playing the symphony over and over. And over, absorbing every note in every cell of my body. I still never tire of listening to this gem.

I remember right where I was driving when I first heard Gottschalk's *Tarantella* on my car radio. Now I keep a Gottschalk CD with that piece in my car player and play it endlessly. I have no idea why music does this to me. My folks never bought any classical records, nor listened to it on the radio, yet the first time I was exposed to it I fell in love.

This was back in the old days when families had friends over for dinner. My folks and I had dinner with Bob and Mary Sullivan. After dinner Bob played some of his Gilbert and Sullivan operettas and his classical records. I was instantly hooked on both. Probably something from a past life clicked in.

If you'd like to share this part of me I've written a guide to the best in classical music. See #33 in the Radio Bookshop ad.

It was my need to share the enjoyment amateur radio has brought me that got me to publish this magazine. The excitement of working rare DX; making ham satellite contacts; pioneering NBFM; pioneering RTTY; making moonbounce contacts; working seven states on 10 GHz; operating from rare DX spots around the

world; DXpeditions; building my first transceiver; flying around the world operating a 20m SSB rig from the plane; sigh.

Amateur radio has brought me a lifetime of enjoyment, excitement, and adventure ... which I want to share so I can help make your life happier and more fun.

That's also why I can't stop trying to share what I've discovered about health and making money... and help you discover what a patsy you (and everyone else) have been ... so you can wise up and beat the odds.

### Higher Education

This is a \$225 billion industry with 4,000 public and private institutions and 14.5 million students. More than 3,000 of the institutions are offering Web classes, and this is causing a paradigm shift in teaching. The two earlier paradigm shifts were the invention of the Greek alphabet in the 8th century B.C., and Gutenberg's press in the 15th century.

The largest of the on-line universities is the University of Phoenix, with 90,000 students. Now thousands of people are getting their college degrees via the Web, anywhere in the world, and while holding their day jobs. Further, they don't have to take obligatory courses which might be of little practical use to them. And, if they think a course stinks, there are a lot of other choices available.

Because I was a ham my high school career advisors pushed me to go to an engineering university. I went to Rensselaer and hated every minute of the classes. I did have a good-time hamming, and with the radio club, the glee club and the RPI Players. Then came WWII — you've probably read about it — and four years as an electronic technician in the Navy. When the government offered to pay for my college I went back to finish the other two years. But by then I'd started to wise up. I saw that engineers were, as a rule, not making a lot of money. The bigger bucks were in management, so I changed to Management Engineering. That didn't change things much — the courses still sucked and the educational mode was memorization, followed by exams. My short-term memory was taxed to its limits. Well, I did have a ball with my ham station at the fraternity (Sigma Chi) house, and was made president of the radio club, which I expanded from about twenty members to over 400. I established WRPI, the campus broadcasting system, which today is the school's largest student activity.

Continued on page 61



## Wild Fluctuations

*Propagation conditions are expected to fluctuate enormously in the early part of the month, with Very Good (VG) and Very Poor (VP) days both appearing before the 15th. The very best days usually precede the very worst ones, so look for peak opportunities to occur on the 6th, 7th, and 8th.*

I suspect that a major solar disturbance may develop on the 9th, so anticipate poor conditions from there through the 13th. Propagation during the second half of the month will be less erratic and generally on the good side of fair.

Since we are approaching the summer solstice, expect low MUFs and strong signal absorption during the middle part of the day. Because 10 and 12 meters are limited at this time of year, most daytime activity will be on 15, 17, and 20 meters. These bands often become saturated by midmorning, especially on Good (G) days, so your best opportunities will usually come right after sunrise. Europe, the UK, and Russia are likely to be the hot spots, but daylight paths to other parts of the world should be workable up to noon and before sunset. The strongest signals will be found along the morning and evening gray lines and at other times on long paths across the Antarctic night. These paths are good for reaching areas such as Indonesia, Southeast Asia, the Indian Ocean, and South Africa. After dark, 20 meters will be your mainstay and provide very broad openings, but when atmospheric noise is low, 30 and 40 meters will give better results, especially when working south of the equator.

This is also the season to look for sporadic-E. This daylight phenomenon is very hard to predict and can occur from the equator (the most likely region) up to the auroral zone. Peak times to look for sporadic-E openings are in late morning and at sunset, especially when solar flux values are very high. When found over the United States, these dense ion "clouds" typically drift westward at several hundred miles per hour and provide strong openings lasting from a few minutes up to two hours. This is one reason not to become overly discouraged with the onset of the "summer doldrums."

June 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
						1 F
2 F-G	3 G	4 G	5 VG	6 VG	7 G	8 F-G
9 VP	10 VP	11 P	12 P	13 F-P	14 F-G	15 F-G
16 F-G	17 G	18 F-P	19 F-P	20 F-G	21 G	22 F-G
23 F-P	24 F-G	25 F-G	26 F-G	27 F-G	28 F-P	29 F-G
30 G						

EASTERN UNITED STATES TO:												
Country	15-20	(15) 30	20 (40)	(20-40)	x	(20)	20	(20)	(15)	(15)	15 (20)	(10) 17
Central America	15 (20)	(15) 30	20 (40)	(20-40)	(20)	x	(15)	(15)	x	(10)	(10-20)	(10) 20
South America	20	20	(20-40)	(40)	x	(20)	x	x	x	x	(20)	20
Western Europe	x	(40)	x	(20)	x	x	x	x	(15)	(15)	x	x
Europe	20	20 (40)	(20)	x	x	x	(20)	x	x	(15)	(15)	(20)
South Africa	x	(40)	x	(20)	x	x	x	x	(15)	(15)	x	x
Eastern Europe	20	20 (40)	(20)	x	x	x	(20)	x	x	(15)	(15)	(20)
Middle East	20	20 (40)	(20)	x	x	x	x	x	x	x	(20)	(15)
India/Pakistan	(15-20)	(20)	x	x	(20)	x	x	x	x	x	x	x
Far East/Japan	(15)	x	x	x	x	x	(20)	(15-20)	(15)	x	x	(15)
Southeast Asia	(15-20)	x	x	(20)	x	x	(20)	x	x	(15)	x	x
Australia	(15)	(15)	x	x	(20-30)	(20-30)	(20)	(20)	x	x	x	x
Alaska	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	(15)	(15-20)
Hawaii	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	x	(15)
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(15) 20	(10) 20	(10-20)	(10-20)	(10-20)	(10) 20
CENTRAL UNITED STATES TO:												
Country	(10) 20	(15) 30	20 (40)	20 (40)	(20-40)	(20)	(20)	(15) 20	(15-20)	(10-20)	(10-20)	(10) 17
Central America	(10) 20	(10) 20	(15) 30	(15) 30	(20-40)	(20)	(20)	(15)	(15)	(10)	(10-15)	(10-20)
South America	(15) 20	20	(20-40)	(20-40)	x	(20)	(20)	x	x	x	x	(15-20)
Western Europe	x	x	(40)	(20-40)	(20)	x	x	x	(10-15)	(10-20)	(20)	x
Europe	(20)	(20)	(20)	(20)	x	x	(20)	(20)	x	(15)	(15-20)	(15-20)
Middle East	(15-20)	(20)	(20)	(20)	x	x	x	x	x	x	(20)	(20)
India/Pakistan	(15-20)	(15-20)	(20)	x	x	x	(20)	x	x	x	x	x
Far East/Japan	x	(15)	(15)	x	x	(20-40)	(20)	20	(20)	x	x	x
Southeast Asia	(15)	(15)	(15-20)	(20)	x	x	(20)	(20)	(15-20)	(15)	(15)	x
Australia	(15)	(15)	(15)	(20)	20 (40)	(20-40)	(20-40)	20	(20)	x	(15)	x
Alaska	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(20-40)	(15-40)	(10) 30	(10-20)	(10-20)	(10) 20
Hawaii	(15-20)	15 (20)	(15-20)	20	20	(20)	20	(20)	x	x	x	(15)
WESTERN UNITED STATES TO:												
Country	(10) 17	(15) 20	(15) 20	20	(20)	(20)	(20)	(20)	(20)	(10-20)	(10-15)	(15-20)
Central America	(10-20)	(10) 17	15-20	(15) 20	(20)	(20)	(20)	(15)	(15)	x	(15)	(10-15)
South America	(15-20)	(20)	20	(20)	x	x	x	(20)	(15)	(15)	(20)	(15-20)
Western Europe	x	x	x	(20)	(20)	x	x	(20)	(20)	(15)	x	x
Europe	(15-20)	(20)	(20)	(20)	x	x	x	(20)	x	x	x	(15-20)
Middle East	(20)	(15-20)	(15-20)	(20)	x	x	x	x	x	x	x	(20)
India/Pakistan	x	x	(15)	x	x	x	x	(20)	x	(15)	x	x
Far East/Japan	(15)	(15)	(20)	(20)	(20)	(20-40)	(20-40)	(20)	(20)	(15-20)	x	(15)
Southeast Asia	x	x	(15)	(15)	x	(20)	(20)	(20)	(15-20)	(15-20)	(15)	x
Australia	(10-15)	(10-15)	15	(15-20)	20	20	20	(20)	20	(20)	x	(15)
Alaska	(10) 40	(10) 40	(10) 40	(15) 40	(20) 40	(20-40)	(20-40)	20-40	(15) 40	(10) 40	(10) 40	(10) 40
Hawaii	(10-15)	(10-20)	(10-20)	(15-20)	20	20	(20-40)	20 (40)	(20-40)	x	x	(10-15)
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(20-40)	(15-20)	(10) 20	(10-20)	(10-20)	(10) 20

**Table 1.** Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



**10/12 meters**

These bands will be weak to nonexistent due to daytime signal absorption, so don't expect much activity here. On the other hand, sporadic-E can sometimes provide some unusual opportunities just before noon and at sunset, but you'll have to rely on luck to catch any openings. When absorption isn't too great, expect a short-skip from 1,000 to 2,000 miles.

**15/17 meters**

Still fairly workable, these bands will deteriorate as July approaches. Normal peaks are midmorning to the east, just before local noon to the south, and from late afternoon through evening to the west. Try long paths across the Antarctic for exotic openings to the Indian Ocean and adjacent areas. Short-skip will average between 1,000 miles and 2,000 miles.

**20 meters**

Expect openings to most areas of the world, especially at night. Be sure to take advantage of nighttime paths to the west of you right after local sunrise, and to the east of you just before sunset. Expect short-skip to vary from 500 to 2,000 miles during the day and 1,000 to 2,000 miles after dark.

**30/40 meters**

Atmospheric noise from tropical and subtropical storms will often limit your opportunities here. However, when conditions are quiet, some good opportunities can be found in the southern hemisphere. Few daytime DX openings will occur and skip will be limited to short distances. After dark, expect skip to be from 750 to 2,000 miles.

**80/60 meters**

High static and weak signals will prevent DX openings on most days. Opportunities may occur near midnight and again in the predawn hours when 40 meters is active. Expect short-skip to vary from 1,000 to 2,000 miles. 75

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**NEVER SAY DIE**

*continued from page 59*

I had kilowatt rigs on 20m and 75m, with two Twin-Three 20m antennas that gave me humongous signals all around the world. Their extra-low angle made my signals the first in and last out, often making me the only American station the DX were hearing.

Oh, yes, education. With the competition from Web programs, universities are going to be forced to improve their curriculums and their teaching methods or go out of business. The one thing that's needed is a publication with an associated Web service which offers objective evaluations of the teaching programs available. Yes, I've a business plan for such a publication. If you know anyone with some money to invest in changing the face of education worldwide, let me know.

**Quiz**

What do you think is the first thing that goes through the mind of a politician when he learns that he's been elected?

Time's up.

It's his re-election campaign.

Why do members of Congress ask how high when the unions say jump? Because the unions can swing an awful lot of votes. Unions have gotten (forced) Congress to pass legislation which gave the unions the power to get workers fired if they don't pay union dues. This provides union officials with billions of dollars every year with which to influence legislation.

As you can imagine, union officials are extremely hostile to the free enterprise system. They've pushed for wage and price controls, even though these have never worked in history. They've forced up the minimum wage, thus keeping millions of youngsters from entering the workforce.

Nearly half the states have enacted laws giving forced dues privileges to union bosses for state and local employment, including most public schools.

Yes, there have been some losses of union membership in the private sector, but public service unionism has been mushrooming. The total union income has been going up far faster than inflation. And most of this money goes to salaries for union officials and staffs devoted to get-out-the-vote political activities. Then, of course, a few million here and there are for state and federal legislator re-election campaigns.

So how big are the government worker unions? 43% of government workers are unionized so far. No wonder the union

bosses are pushing Congress to expand the government payrolls — that's more dues money for them.

It's the unions that are the main force preventing states from instituting school reforms, by the way.

How can poor we, the people, do anything about this mess? That's pathetically simple — just do everything in your power to make sure that no elected politician is ever, ever re-elected. One term and back to the private sector, buster. No more career politicians. No more running the country by graft. The power for change is in your hands at the next primary. If you're happy paying half your wages in taxes, re-elect your crook. If you have no problem with our schools getting more and more expensive and have no interest in your child's future, fine.

If you, your friends, co-workers, and neighbors revolt against the system by going the NRA route (Never Re-elect Anyone) this will be the biggest revolution in a couple hundred years.

**Howcum?**

Howcum I'm going on and on in a ham magazine about health? (a) I've been going on and on in my editorials for over 50 years about things I think should interest readers. So that's no surprise. You knew what you were getting into when you subscribed. (b) When I go to hamfests I see a large percentage of hams are fat old men with big, constipated guts hanging over their belts. We're talking prostate or colon cancer any day now. (c) Other than doing one hell of a lot of obscure research there is no way to find out what I've discovered about why we make ourselves sick and how to stop doing it. (d) I love the letters from readers who've had big weight losses or cured "incurable" illnesses. (e) If you want more ham stuff in the magazine, get busy and write it.

**LTA**

That's lighter-than-air ... dirigibles and cargo lifters.

An article in *Forbes* on the Cargo-Lifter company's huge hangar outside Berlin got my attention. I tried thirty years ago to get King Hussein interested in building lighter-than-air cargo lifters as a new industry for his country, but didn't get anywhere.

Dirigibles were going great guns in the early 1930s, with the Hindenburg making regular Atlantic crossings. When it burned that stopped all dirigible interest. Of course, now we know that it wasn't the hydrogen gas that exploded, it

*Continued on page 62*



## NEVER SAY DIE

continued from page 61

was the highly flammable paint they used on the skin.

The CargoLifters will be able to lift 350,000 pounds from anywhere and put it down anywhere else. Right now it's between very difficult and impossible to move really big stuff around the country, so these LTAs are going to be kept busy.

The article mentioned that the Zeppelin company currently is taking sightseers daily for flights over Lake Constance. Hmm. I'll bet thousands of *Forbes* readers will see that and turn to the next page. I quickly tore out the page and read the Lake Constance part to Sherry. We're going for a Zeppelin ride as soon as we can organize it. We haven't visited nearby Luzerne and Bern in years, so we'll drive around a little, too. Maybe have some Black Forest cake at the Hohenzollern Castle again.

### Prostate

Now that most hams are well into their prostate cancer years, the article in the April 22nd *Newsweek* should have caught their attention. The headline cited changes in diet and lifestyle as a choice

over conventional treatment. Hey, isn't that exactly what I've been preaching?

Dr. Dean Ornish said, "Your body often has the ability to begin healing itself if you stop the behavior contributing to the problem." Now you've gotten it from a doctor, so that makes it true. Right?

Many men are unwilling to go the surgery or radiation route, considering their side effects (like impotence) and high recurrence rates (around 40%), so the diet and lifestyle change is attractive. Read my book.

### HGH

You've probably heard the commercials for HGH, the human growth hormone. Great stuff, probably, but according to the *Harvard Health Letter*, it's only effective when injected. Worse, unless you've got a confirmed growth hormone deficiency, there's no real justification for these pricey injections — which cost about \$20,000 a year. And worse, yet, they're now suspected to increase cancer risks. Just what you need.

The newsletter goes on, "Despite label claims, there are no over-the-counter pills, sprays, or creams that contain HGH." No wonder I'm hearing from people using them who claim they've seen no results.

### Those Tests

Politicians love the idea of administering standardized tests to evaluate how our schools are doing. Yes, you bet there are some problems. Aren't there always when the government messes with things?

The problems? Well, for one, since the tests don't count as part of school work more and more students have wised up and are just ignoring them, marking "C" for every answer. That way they can get it over in a few minutes instead of wasting an hour or so.

For another, since the tests are kept secret to prevent teachers from teaching to them, they often ask irrelevant questions, with some requiring facts that even the teachers don't know.

### If I Were President

Thomas Sowell (you should read his books) wrote in an essay that if elected president he'd immediately shut down all schools of education. Then he'd pay every professor of education \$1 million to never teach nor write again. He figured that the \$40 billion spent on this

Continued on page 64

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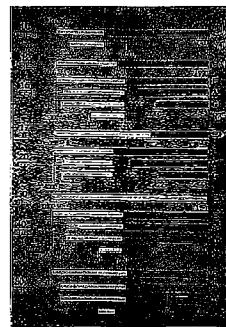
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# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Blood Purifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! \$10 (#01)

**Plant Growth Stimulator:** This has the same circuit as the above, all ready to use. Postpaid: \$155 (#PGS).

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life

aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the *Drum*. \$5 (#10)

**Travel Diaries:** You can travel amazingly inexpensively — once you know the ropes. Enjoy Sheny and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under \$1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. \$5 (#11)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. Yes, of course we pay for your articles! \$0 (#78)

**Wayne's Caribbean Adventures:** My super budget travel stories — where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

No, I'm not a nut case.  
**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gottschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. \$5 (#35)

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**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. As an iconoclast I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

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**Colloid Reprint.** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Clips.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)

**Silver Colloid Kit:** \$25 (#80-98-99)

**Four Small Booklets Combined:** Dowsing: why and how it works; Super Organic Food: a trillion dollar new industry; Schools in 2020: another \$ trillion industry; Anthrax, a simple cure. \$3 (#86)

**Stuff I didn't write, but you need:**  
**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs — such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax — a capping blow for René's skeptics. \$25 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon and wondered at their weird gait. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of give aways that the photos and films had to have been faked. With our gov't it seems to be just one cover-up after another. \$40 (#93)

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This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

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**FOR SALE** — **DRAKE TR-7/R-7** 13 Extender Boards and Digital Jumper Card for servicing. See <http://users.atnet.net/~rsroffne>. \$63.50 includes postage. **Bob W7AVK**, 2327 Malaga Road NE, Moses Lake, WA 98837, email: [w7avk@arll.net](mailto:w7avk@arll.net). BNB647

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**TOWER** for sale. 100-ft. Military AB-105c. Heavy Duty galvanizing. Dismantled, includes guy wire, screw anchors, new bolts, excellent condition. \$1,200.00 **FIRM:** You Pick up. Rotator available Extra\$ **Jim W9GLR** (863)-984-1317. BNB655

## NEUER SAY DIE

*continued from page 62*

would be the greatest bargain for our education we've ever gotten.

All people who sue and lose would have to pay court costs and the attorney's fees for the person they sued, plus pay for the value of the person's time they sued. Attorneys filing claims later ruled frivolous would be fined the first time and then disbarment and jail time if they keep doing it.

All elected officials would be limited to one term. The people who created our country were not career politicians and there's no sign that career politicians have done a better job.

All wage and price controls would be abolished and made unconstitutional. Permanent job tenure would be abolished throughout the federal government, including the Supreme Court.

But, as it is, just the one-term limitation for elected officials would go a long, long way toward returning the government to the people ... who today have almost no say in what's going on.



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# 73 Amateur Radio Today

## Build:

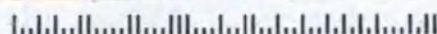
- VLF to HF  
Receiving  
Loop
- Bench  
DC P.S.
- Ladder  
Xtal Filters  
for NBFM

## More Tesla

## Testing VHF DX

## The 21st-Century Scrounger

COVER:  
World ARDF  
Championships  
page 51



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#### E-Mail

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#### Cover:

Photo by Joe Moell KØOV

## QRX . . .

### 12-Step Program for E-mail Forwarders

OK, everyone, all together:

1. I will NOT get bad luck, lose my friends, or lose my mailing lists if I DON'T forward an E-mail!

2. I will NOT hear any music or see a taco dog, if I DO forward an E-mail.

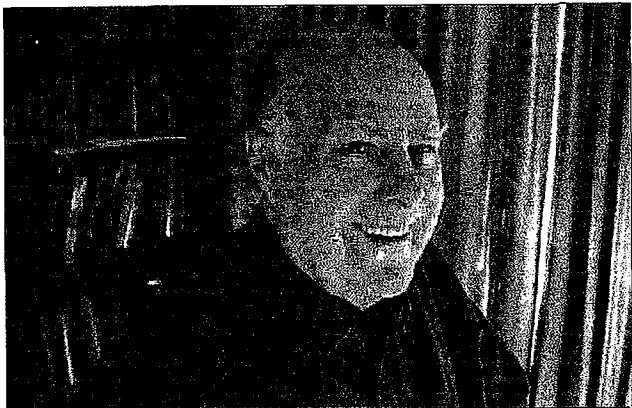
3. Bill Gates is NOT going to send me money, and Victoria's Secret doesn't know anything about a gift certificate they're supposed to send me.

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article (IBM (ok) or Mac (preferred) formats), carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

## NEVER SAY DIE

Wayne Green W2NSD/1

w2nsd@aol.com

www.waynegreen.com

### Shareware

It was the fun I was having with ham teletype (RTTY) that got me to start a newsletter back in 1951. I just had to share the fun I was having with as many others as I could. My little mimeographed newsletter grew into a small magazine. Pretty soon I was doing an RTTY column for *CQ* and there were thousands of us having a ball with this first digital mode of communication. The next thing I knew I was the editor of *CQ* and sharing the fun I was having with amateur radio with tens of thousands of readers.

When the publisher fired me rather than catch up on the year's pay he owed me I decided to start my own magazine — this one — so I could share the fun I'd had building my own equipment, working DX, pioneering on the VHF bands, and so on.

In my editorials I've shared the fun I've had on DX-peditions, my ham satellite contacts, slow scan, RTTY, repeaters, and so on. I've always urged my readers to "come on in, the water's fine."

So what about you, Buster? What's it take to get you busy with your word processor and sharing the fun ham radio has and is providing you? If it wasn't any fun you'd be looking for something else to do, right?

Field Day is a ball, but have you ever bothered to share the fun you've had with others by sending in an article or at least a letter to the editor?

How many exciting times have you had that you'll

never forget? Like the time I managed to work Moscow via Oscar where there was a 20-second window of opportunity! Like the contest weekend when I worked 100 countries on 20m SSB. Like the night I decided to see if I could work all states on 75m — and did! Like the time I worked all continents within 20 minutes. Like the time I worked W7IMW/C7 in Tiensin, China modulating a signal generator running a tenth watt. Like I could go on for days with things I'll never forget.

I'd love to publish pages and pages of letters about the exciting things you'll never forget.

Six meters has been going berserk lately, with the twin sun spot peaks. Too bad if you've been missing the once-in-a-lifetime conditions. Too bad, too, if you haven't been sharing your excitement with as many others as you can via your word processor. Tsk.

### Advertising

Another really fun part of the hobby is getting a new piece of equipment and using it. Again, here's an opportunity for you to share the fun you're having with as many other hams as you can. Get busy writing. Sure, we can read the ads and sales literature, but nothing is more persuasive than hearing from others who are having a ball with something new.

Judge Glanzer K7GCO is all fired up over his six meter Raibeam, and he writes about it. He loves it and wants to

share the fun he's been having with others. So, how about you? Hey, wake up!

When some company is putting out a great product, give 'em a hand — and I don't mean by clapping. Help 'em get the word out.

Sure. I'd love to have more ham industry advertising — the more ads we have, the more pages you'll have to read. But it's going to take the sales of equipment for them to have the money to advertise. I'm not sure that they are aware of the concept that their sales depends on their prospective customers being aware of their products, and that awareness is the result of exposure. If your prospective customers don't know you exist, you won't. So you can help the manufacturer by sharing the fun you've had with others, at least via a letter.

### More Sharing

While most of the readers turn first to my editorials to find out what weird subject of book I want to share with them next, there are a few who grouse when I'm not writing totally about hamming. I really feel sorry for anyone with so little an interest in learning about things — and most of the stuff I write about you aren't going to find many other places — if any.

### Speed Reading

Yes, speed reading is real. Yes, people can learn to read thousands of words per minute, and with 100% comprehension. The good news is that

anyone who really wants to can learn to speed read. The bad news is that it's a whole lot more difficult for adults to learn than for young kids. Kids from eight to twelve are able to learn to speed read in a few hours.

How come the difference? Slow reading, where you go one word at a time, is a left brain operation. Speed reading, where you see a whole page at a time, is a right brain deal, so you have to retrain the right brain to this new task. Kids, whose brains are still busy growing more neurons and connections, have a big advantage.

When you look at a picture you don't look at each little part of it, you take in the whole picture. With a little practice, it just takes a glance for you to describe every detail of the picture. It's the same thing with learning to speed read.

When I took a speed reading class at the local high school they taught us to see groups of words, and then whole lines. This sped us up, but just from the usual couple hundred words per minute to a few more hundred, not thousands. At that time the concept of photo-reading was not even on the horizon.

A book and a video from George Stancliffe, Box 227, Toppenish WA 98948, with his *Speed Reading 4 Kids* info, explains how anyone can teach kids 8–12 to speed read, even if they aren't able to do it themselves. The video shows how easily and quickly

*Continued on page 59*



continued from page 1

4. Ford will NOT give me a 50% discount even if I forward my E-mail to more than 50 people!

5. I will NEVER receive gift certificates, coupons, or freebies from Coca-Cola, Cracker Barrel, Old Navy, or anyone else if I send an E-mail to 10 people (OR OUTBACK STEAK HOUSE!!!).

6. I will NEVER see a pop-up window if I forward an E-mail ... NEVER, NEVER!!

7. There is NO SUCH THING as an E-mail tracking program, and I am not STUPID enough to think that someone will send me \$100 for forwarding an E-mail to 10 or more people!

8. There is NO kid with cancer through the Make-a-Wish program in England collecting anything! He did when he was 7 years old. He is now cancer-free and 35 years old and DOESN'T WANT ANY MORE POSTCARDS or GET WELL CARDS.

9. The government does not have a bill in Congress called 901B (or whatever they named it this week) that, if passed, will enable them to charge us five cents for every E-mail we send.

10. There will be NO cool dancing, singing, waving, colorful flowers, characters, or program that I will receive immediately after I forward an E-mail. NONE, ZIP, ZERO, NADA!!

11. The American Red Cross will NOT donate 50 cents to a certain individual dying of some never-heard-of disease for every E-mail address I send this to. The American Red Cross RECEIVES donations.

12. And finally, I WILL NOT let others guilt me into sending things by telling me I am not their friend or that I don't believe in Jesus Christ. If God wants to send me a message, I believe the bushes in my yard will burn before He picks up a PC to pass it on!

Now, repeat this to yourself until you have it memorized, and send it along to at least five of your friends before the next full moon or you will surely be constipated for the next three months, and all of your hair will fall out.

*Received on the Internet (where it had been forwarded to us).*

## And Now, a Word From ...

*No, Newsline isn't a sponsor of 73 — or affiliated with it in any way — but it is the source of much grist for the QRX mill. And much more important, Amateur Radio Newsline provides desperately needed publicity about ham radio to ARS and non-ARS outlets around the world. We urge 73 readers to support Newsline with a donation — and tell them Uncle Wayne sent you! — J.B.*

Hi, I'm Andy Jarema N6TCQ, Chief Financial Officer of the not-for-profit organization you know as the *Amateur Radio Newsline*.

Let me start by saying that we really appreciate the individuals who give of themselves in the form

of helping us out, but we don't hear from enough clubs. There are literally thousands, perhaps tens of thousands of traditional radio clubs and repeater clubs out there. These are the wonderful folks who re-transmit our broadcasts, bringing your nets increased value, and giving your members the latest in amateur radio news and information to enhance their hobby.

But *Amateur Radio Newsline* cannot continue without the funding needed to pay the monthly bills. And right now, we can't.

In the quarter century that it has existed, no one at the *Amateur Radio Newsline* has ever taken a salary. We all volunteer our time and talents. But we ARE faced with monthly expenses for gathering and delivering the news to YOU! We are talking telephone, Internet access, and the like. This hasn't changed.

We are also talking about the money we spend each year to help ensure the future of amateur radio through the Young Ham of the Year award program. Yes, Vertex Standard, CQ, Dave Bell Associates, and Rosewood cover the expenses and gifts for the recipient. They do not cover the administration expenses. That's our part, and it ran close to \$1,200 last year.

The bottom line is this. I am asking that you try to find it within your organizational or individual heart to help us continue this service. As we have said before, whether *Amateur Radio Newsline* continues to provide this service or instead disappears is totally your decision. We are here to serve you for as long as you want us. Your response during the next few weeks will provide the answer.

The address for *Amateur Radio Newsline* is Post Office Box 660937, Arcadia CA 91066. Our Web site, with more information, is [www.arnwline.org].

Thank you so much! — N6TCQ.

## Helping the Future: The IRLP4KIDS Net

The Internet Radio Linking Project is now playing host to youth in amateur radio. This, with the formation last December of the new "IRLP4KIDS Net."

The cyberspace-to-radio network was the brainchild of Paul Cassel VE3SY. It's purpose is to support young hams and to give them a place to meet and interact with one another. The net meets Saturdays at 0100 UTC on IRLP Reflector #2. In North America, the net is on Friday nights at 9:00 p.m. Eastern Daylight Time. Currently, the network has about a half dozen young members, and it welcomes more.

To join or learn more, take your son or daughter and Web browser over to [www.groups.yahoo.com/group/irlp4kids] to join the IRLP4KIDS e-group.

Also, the net is looking for more young control

stations. If you are a young ham or know one who wants to become part of this thrilling youth-oriented Internet radio linking project, contact Jason Noehlin by E-mail to [K0IIN@arll.net].

*Thanks to K0IIN, via Newsline, Bill Pasternak WA6ITF, editor.*

## Wrong Number

If you get an E-mail, voice mail, or page telling you to call a phone number with an 809 area code, beware. The *CGC Communicator* reports that chances are, it's a scam and your phone bill will be astronomical. The FCC has already issued a public warning about calling this area code. It's on the Web at [www.fcc.gov/clb/consumerfacts/809.html].

*Thanks to CGC Communicator and the FCC, via Newsline, Bill Pasternak WA6ITF, editor.*

## Dear Sir ...

The following is (supposedly) an actual letter. The original was typewritten, and the original spelling and grammar have been left intact.

To Mr. (name omitted)  
District Manager for Alabama Radio Shack  
3300 N. Pace Blvd  
Pensacola, FL. 32505

Dear Sir,

This letter is complain about the problems I have having with the ham radio model number 19-1101 I had got from your company Radio Shack. I had this shipped special to me from your store 1096 Eastdale Mall Montgomery Alabama. I was got this because I think that I would get transmitt further that I did with the TRC 217 40 channel walkie talkie.

The problem that had first was when I was going to hook this radio HTX-1000 to the antenna the conektor on the radio was wrong it wouldn't attach to my cable. I was able to hook it finally by making a small change in in the connektor. As soon as I tried to use it there was no sound coming at all.

This happened for two days and I never did get to talk to anybody the whole two days. That day the cable company came knocking my door and said there was something causing problems at my house and disconnected my radio from the cable line. you knew when I brought the Radio that I was going to use that for my antenne. You didn't tell me not to why not?

Next time I decided to put the HTX-1000 in my automobile I thought I would see how it worked their. I hooked it to my CB-antenna and at least I could hear people. But what happens now is no one wants to talk to me because they says you have to have a licencs to talk to them.



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[www.riselectronics.com](http://www.riselectronics.com)

Why? I don't have to have a license to talk on my CB. They'll talk to me there. Anyhow it doesn't matter much anymore because somebody else took the radio HTX-1000 from my automobile.

What I would like for you Radio Shack to do is refund my money because I don't have the radio anymore and it's not my fault I don't and I think you should give me back my money. Also the cable company here says that I hurt something in their line and want to be paid to fix it. It will cost \$2482.98 to fix the equipment they say was damaged because you didn't tell me not to hook it to the cable. Please remit to me the check for \$2758.53 for damages due.

To save this matter from going to court the check must be in my hand by June first or I will turn this over to my attorneys of law.

Thank you  
(name withheld)

Thanks to Radio Flyer, the U\*BE\*T (Utah) ARC newsletter, May 2000.

## Things You Can Learn From a Dog

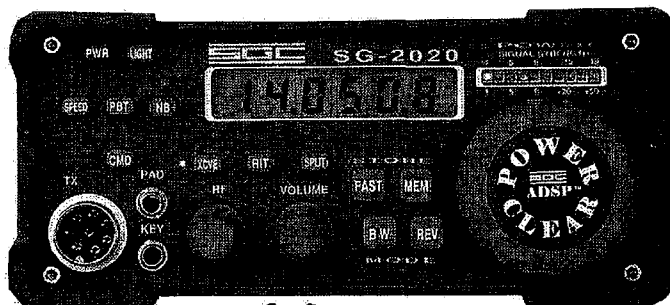
- Never pass up the opportunity to go for a joyride.
- Allow the experience of fresh air and the wind in your face to be pure ecstasy.
- When loved ones come home, always run to greet them.
- Let others know when they've invaded your territory.
- Run, romp, and play daily.
- Eat with gusto and enthusiasm.
- Be loyal.
- Never pretend to be something you're not.
- If what you want lies buried, dig until you find it.
- When someone is having a bad day, be silent, sit close by, and nuzzle them gently.
- Thrive on attention and let people touch you.
- Avoid biting when a simple growl will do.
- On hot days, drink lots of water and lie under a shady tree.
- When you're happy, dance around and wag your entire body.
- No matter how often you're scolded, don't buy into the guilt thing and pout ... run right back and make friends. Bond with your pack.
- Delight in the simple joy of a long walk.

Thanks to Radio Flyer, the U\*BE\*T (Utah) ARC newsletter, Dec. 1997.

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# LETTERS

## From the Ham Shack

**Art Housholder K9TRG.** You are always asking for pictures of ham functions, so here is one. I think you know that we have had a ham luncheon every Thursday here on the northwest side of Chicago, in the Palatine area, for many years, at the Palatine Inn on the Northwest Highway. We have moved to different locations a few times in the last 10 to 15 years. A few of us get there as early as 10 a.m.; the rest wander in later. We do try to leave shortly after noon, as the restaurant starts to get full then. By then, most of us have freeloaded off of the coffee pot long enough. The food is reasonably priced, good selection, good quantity, prepared well, and best of all, tastes good.

The common bond of course is ham radio and computers. We have had FCC directors, pilots, magazine editors, race car mechanics and drivers, machinists, truck drivers, a dean and professors from Harper College, Motorola vice presidents, you name it.

Some of us bring magazines that we have read and pass them on; some of us bring computer-related hardware and/or software that we pass on. Sometimes someone brings a new home-brew item or something "store bought" to show and tell.

All hams and nonhams are welcome. We would love to see and meet new people. If anyone would like more information, I have had the same *Callbook* address and phone number for at least 30 years. My E-mail address is [ahousholder1@attbi.com], or [ahousholder@juno.com].

**William Baker WIBKR, president, Thirteen/WNET, New York NY.** I appreciate the terrific articles in 73 this April. Of particular importance was the Watts/Wagner article about the history of Nikola Tesla. It was most informative, many thanks.

**Les Warriner WA7HAM.** Having taught Basic Electronics and Amateur Licensing Classes for the past 17 years both at the Highline Community College and here in our little agricultural community, I have found some interesting facts.

When we get started going through our spiel, we start looking at blank faces with expressionless eyes, not understanding what we are talking about. Like if our wives describe to us some fine information on a sewing project. The vocabulary is strange and different.

So, to get them used to some of the words and not necessarily (yet) their uses, I have made up a number of word puzzles that are handed out and that they have the opportunity to work on. The comments have been very positive, especially from the younger generation that has not yet had the opportunity to get used to some of our slang.

It is fun to watch their expressions when you are in a lecture or Q&A session when these words that they have become acquainted with start to make sense to them.

Then, the week before testing, I hand out yet another puzzle — except that these are

local ham calls. In our case, within a circle 20 miles in diameter around our QTH. This one really gets them going. "Oh, I know him," etc.

In that I believe that the two-day memorization courses touted by the ARRL are not only bad for our hobby but also cheat the attendee, our courses here are 10 weeks and we graduate knowledgeable hams who know how to act on the air. Many now are Extra class. A number have gone on to various entities and are computer techs, etc.

Even our high school now has a credit class in computers, repair, upgrade, installation, networks, all of the "goodies." This ham class was a large part of starting this credit class, as the graduates of the ham class were doing this type of work in the district.

Just thought that maybe you'd like to know of our success and the methods used. After all, ham radio IS fun! 73!

**Kevin Abnett, Fairbanks AK.** You have a lot of crazy-sounding ideas. Each year fewer of your ideas sound crazy to me. More and more of your ideas are making sense. One of us must be losing his grip on reality. :-)

**Ken VE1DS.** Hi, Wayne: I just finished reading your April editorial re the future of the hobby. I have been an amateur for 36 years and also worked in the telecom field all my life. I have also seen a lot of modes come and go, also DXing, county hunting, cc numbers, and the other attractions of the hobby. Kids are not interested in a lot of this stuff, as it can't compete with the Internet.

Now we have a tool that I think will bring on the kids. If you have time, please go to this URL and download the I link program. It's very small, and you can get started in a few minutes. This mode allows you to use the Internet as a transparent path between the computers in two ham shacks. Big deal, not really — the kids are doing this all the time with their friends on MSN, etc. However, the important difference is that you can then interface to your VHF/UHF/HF rig and continue to pass the signal to a mobile or any other station via a repeater or your own station.

This would allow two kids with pocket-size 2-meter rigs, to QSO, e.g., VK-land school playground to another schoolyard in



**Photo A.** Palatine (IL) area hams get together for a luncheon every Thursday. L-R: Frank W9FM, Don WA9DGY, Ron WB9PTA, John WA9JBT, Art K9TRG.



# YOU Can Build This VLF to HF Loop Receiving Antenna

*Part 1 of 3.*

*A year ago, I built and tested more than 50 different ferrite loop antenna configurations. This article shows you how to build a loop tuner and a range of plug-in ferrite and air-loop antennas for receiving frequencies from 20 kHz to 7 MHz.*

**D**espite exaggerated claims that circulate, loop antennas aren't a magic solution to curing all local power line noise, nor will one fully substitute for a full-size outdoor antenna. Nevertheless, loop antennas do permit nulling noise or interfering signal and offer surprising performance for a miniature antenna.

## What's a loop antenna?

Loop antennas have been with us as long as radio has existed. Indeed, Heinrich Hertz demonstrated the

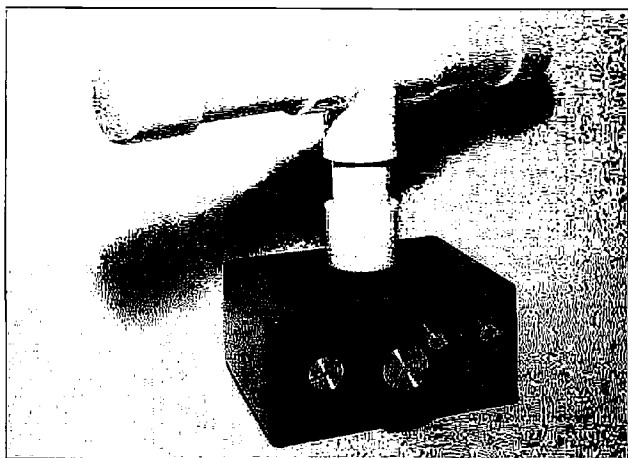
existence of radio waves in experiments in 1886–88 using a loop receiving antenna. (He used an end-loaded dipole for transmitting, though!)

The simplest definition of a loop antenna is one in which the antenna conductor forms a closed circuit. The antenna conductor may be formed into a square, triangle, circle, or diamond. It may have one turn, or multiple turns. It may be formed over air, or over a magnetically active material such as ferrite. But, it's still a loop.

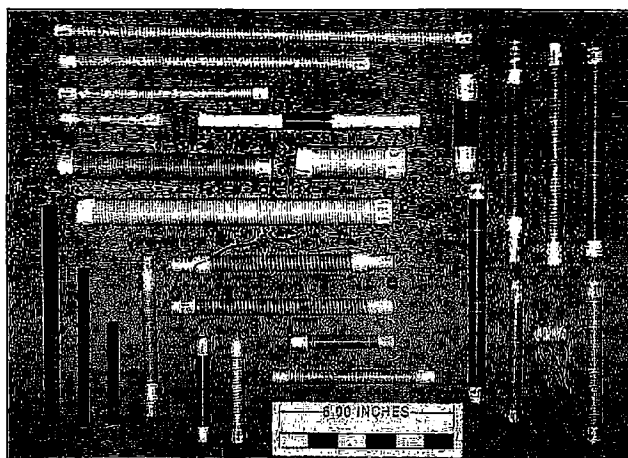
The most important factor in analyzing a loop antenna is its size. This

project involves "small" loop antennas. A "small" loop is one where the loop diameter is much less than a wavelength. At 7 MHz, the highest frequency involved in this project, a wavelength is around 140 feet. The largest loop I built is a square around 1 foot on a side, or about 0.007 wavelengths, so it's safe to consider it "small." The remainder of this article will only refer to a "loop" with the understanding that we mean "small loop."

A loop antenna is an inductor, and like any other inductor it can be resonated with a capacitor. It can be shown



**Photo A.** Front view — loop tuner with ferrite loop.



**Photo B.** Some of the ferrite loop antennas that the author built.



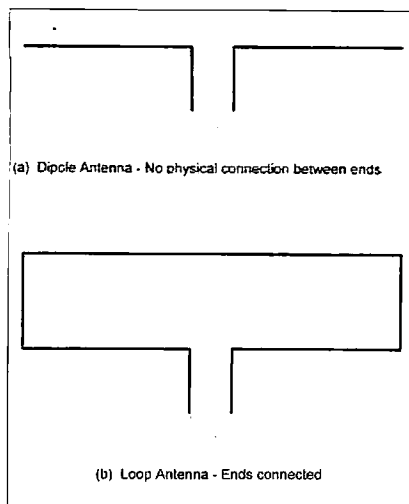


Fig. 1. Dipole versus loop antenna.

that a resonant loop antenna will develop an open circuit voltage given by the following equation:

$$V_{oc} = [(2\pi ENAQ\mu_{eff})/\lambda] \cos \phi \quad [1]$$

where:

$V_{oc}$  is the open circuit voltage at the ends of the loop in volts

$E$  is the field strength of the incoming signal, in volts/meter

$N$  is the number of turns in the loop

$A$  is the area of the loop in square meters

$Q$  is the  $Q$  of the tuned circuit consisting of the loop inductance and tuning capacitor

$\mu_{eff}$  is the effective permeability of the core, 1 if air core, 20 or so for Type 61 material, and about 35 for Type 33

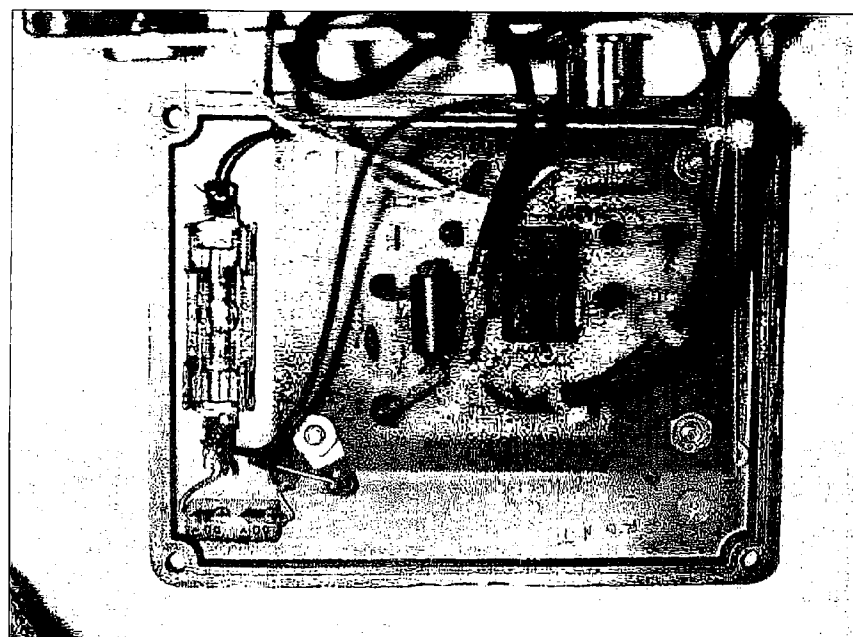


Photo C. PC board installed in tuner housing.

material when made into rods of the size I used ( $\mu_{eff}$  is a function of both the  $\mu$  of the underlying material as well as the rod length to diameter ratio)

$\cos \phi$  is the cosine of the angle the plane of the loop makes with the incoming signal

$\lambda$  is the wavelength of the signal in meters

Those elements of Equation 1 that are under our control are  $A$ ,  $N$ ,  $Q$ , and  $\mu_{eff}$  — for a stronger received signal we can increase the size of the loop, wind more turns, use larger wire for higher

$Q$ , and, possibly, wind the loop on a material with a large  $\mu_{eff}$ . Of course, real-world factors, such as distributed capacitance, size, weight, and available core material impose limits on practical loops.

### Loop tuner: theory of operation

Varactor diodes D1–D4 tune the loop inductance to resonance. Relay K1 switches D1–D4 between two modes: normal and low frequency. In normal mode (K1 not powered), D1 is paralleled with D2 and D3 is paralleled with D4. These two paralleled strings

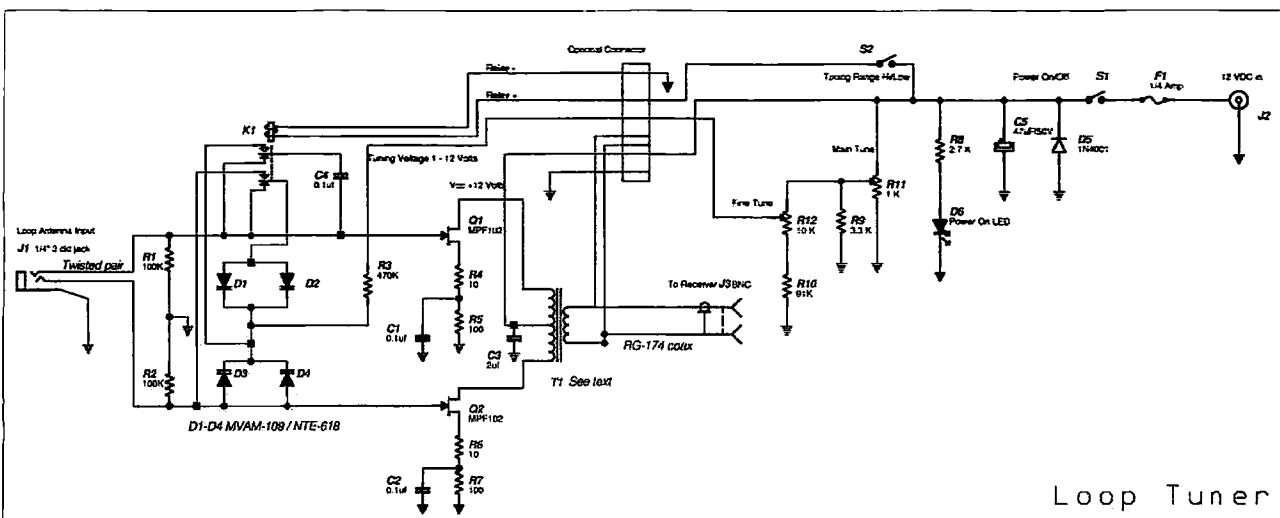


Fig. 2. Schematic diagram.



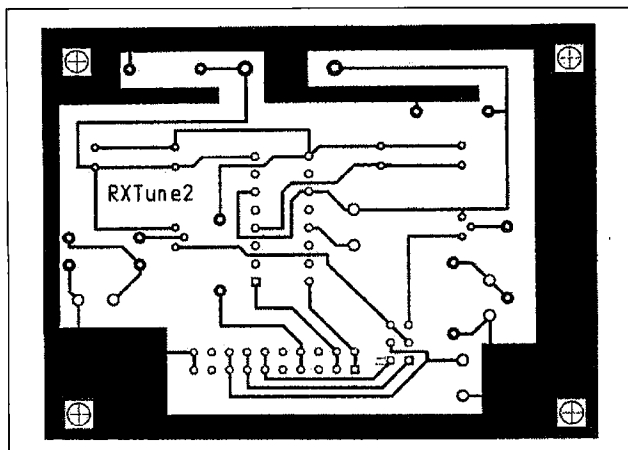


Fig. 3. PC board, copper side view.

are then in series for RF. This gives a net equivalent capacitance equal to a single varactor diode, but minimizes interaction of received signal with diode bias. In low frequency mode, D1-D4 are paralleled. This provides four times the capacitance of a single varactor. Some degradation of performance occurs in this configuration, but it permits an additional tuning range with a single loop antenna.

In either normal or low frequency mode, D1-D4 are reverse-biased by the tuning voltage. R3 isolates the tuning

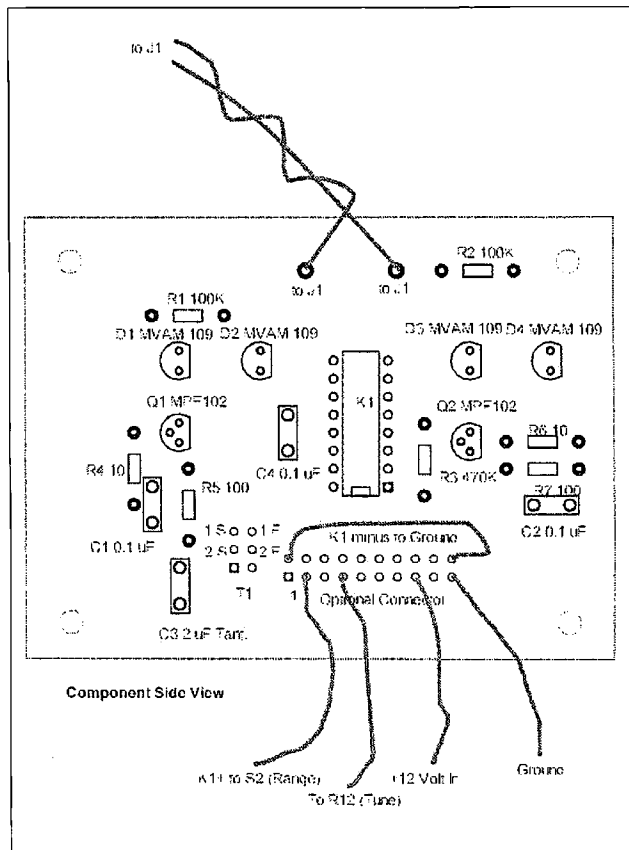



Fig. 4. Parts layout component side view.

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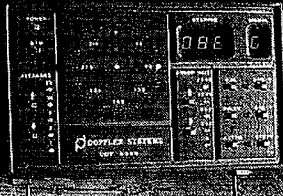
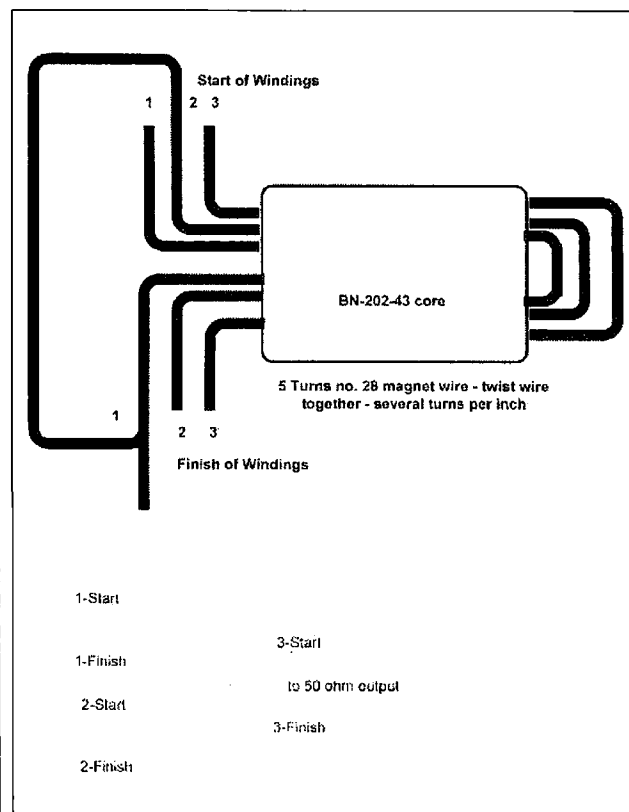



Fig. 5. Winding T1.



Qty.	Name	Value	Comments
3	C1, C2, C4	0.1 $\mu$ F	Disc ceramic
1	C3	2 $\mu$ F tantalum, 35 V	
1	C5	47 $\mu$ F 50 V electrolytic	
4	D1-D4	MVAM-108 varactor	Substitute NTE-618
1	D5	1N4001	Safety diode, 1 A, >50 V PIV satisfactory
1	D6	Power-on LED	
1	F1	1/4 A	
1	J1	1/4-in., 3-ckt jack	
1	J2	Coaxial DC power jack	Radio Shack: Select to match your preferences
1	J3	BNC chassis mount	
1	K1	Omron model G5V-2-H1 with a 12 V coil	Substitute with caution: This must be a relay that works with low-level signals
2	Q1, Q2	MPF102 FET	
2	R1, R2	100k	1/4 W 5% carbon film
1	R3	470k	1/4 W 5% carbon film
2	R4, R6	10 $\Omega$	1/4 W 5% carbon film
2	R5, R7	100 $\Omega$	1/4 W 5% carbon film
1	R8	2.7k	Select for desired LED brightness; 1 W may be necessary
1	R9	3.3k	1/4 W 5% carbon film
1	R10	91k	1/4 W 5% carbon film
1	R11	1k pot	1 W
1	R12	10k pot	
2	S1, S2	SPST mini toggle switch	
1	T1	5 trifilar turns BN 43-202 binocular core	See text
1		PCB	
1		10-pin connector	Optional; Molex 22-27-2101
1		Mating 10-pin connector	Optional; Molex 22-01-2105 or 22-02-2101
1		LMB die-cast box KAB3432	
2		Knobs for R11 & R12	
1		14-pin DIP socket for K1	Optional
1		Fuseholder for 3 AG fuse	

Table 1. Loop tuner parts list.

voltage from the resonant circuit formed by D1-D4 and the loop inductance.

Q1 and Q2 form a conventional balanced amplifier. This circuit is taken from Chapter 2, *Ferromagnetic-Core Design & Application Handbook*, M.F. "Doug" DeMaw (MFJ Publishing Co., Inc., Starkville, MS, 1996). R4 and R6 are un-bypassed to help stability. T1 consists of 5 trifilar turns of no. 28 wire wound through a BN-202-43 binocular core. C2 bypasses RF from the DC power supply and should accordingly have low RF reactance through the desired frequency range. A

tantalum capacitor should be used to meet this requirement. If you use a conventional 2.2  $\mu$ F electrolytic, parallel it with a 0.1  $\mu$ F disk ceramic.

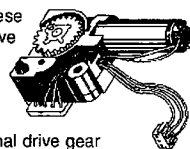
The +12 volt input power enters through a standard coaxial power plug, and is protected by fuse F1. In the event of an inadvertent polarity reversal, safety diode D5 will be forward-biased, thereby blowing F1. Switch S1 controls power to the circuit, while S2 enables or disables relay K1, thereby switching between normal and low frequency ranges. C5 provides low frequency bypassing of the input voltage, while R8 and D6

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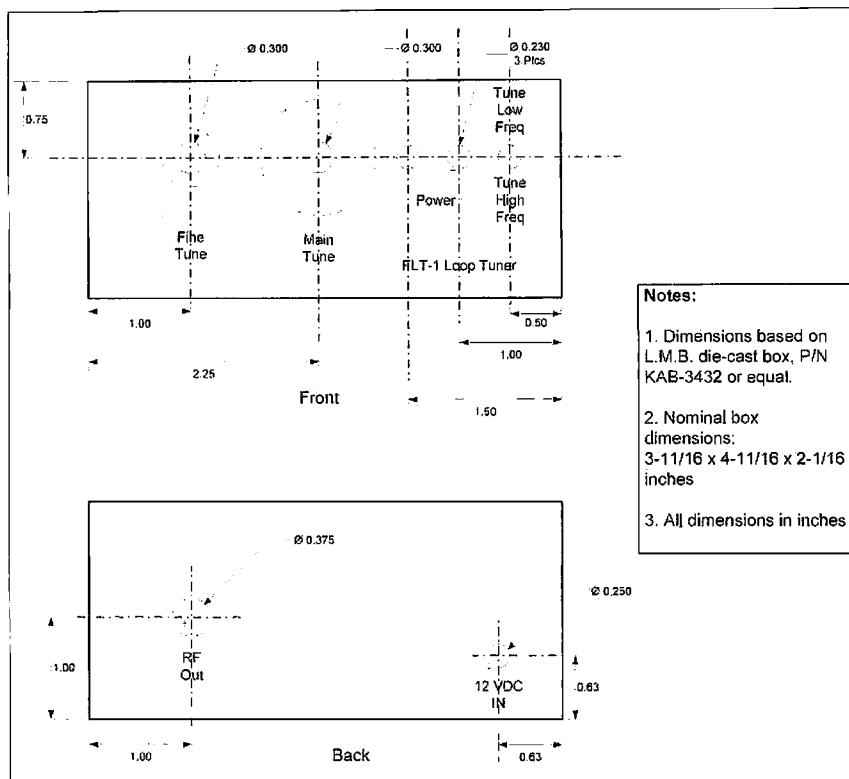
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2. Nominal box dimensions: 3-11/16 x 4-11/16 x 2-1/16 inches
3. All dimensions in inches

Fig. 6. Front and back layout.

indicate power-on status. Depending upon the particular LED you use, adjust R8's value to give the desired brightness.

R9 and R11 provide coarse tuning, providing a voltage output between 0 and +12 volts. The coarse tuning voltage is connected with R12 and R10, which form a variable voltage divider that shifts the coarse tuning voltage downward by a maximum of 10%. To reduce interaction between the coarse and fine tuning, I've made

the R12-R10 voltage divider resistance much higher than the coarse tuning adjustment. Don't omit R9; although it looks unnecessary, it helps linearize the coarse tuning. (Part 3 of this series will include a section on linearizing a nonlinear world.) R11 dissipates less than 200 mW, so a 1-watt pot will work.

The minimum capacitance value reflects about 10 pF stray due to the PC board and the wiring associated with J1.

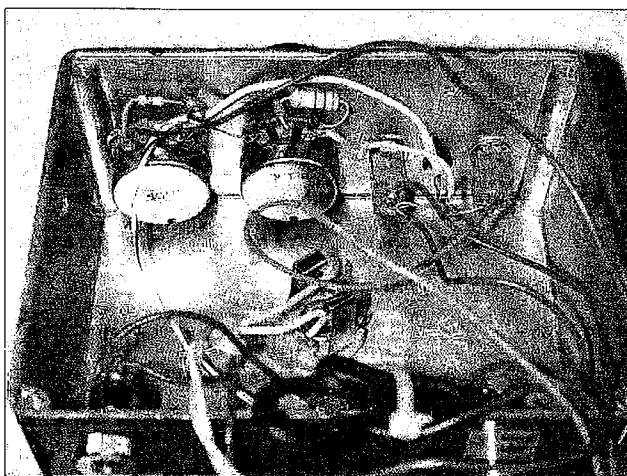


Photo D. Control circuit wiring.

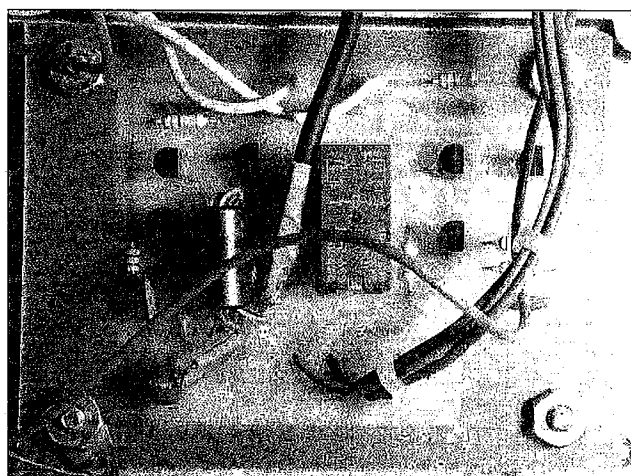


Photo E. Close-up of the PC board.



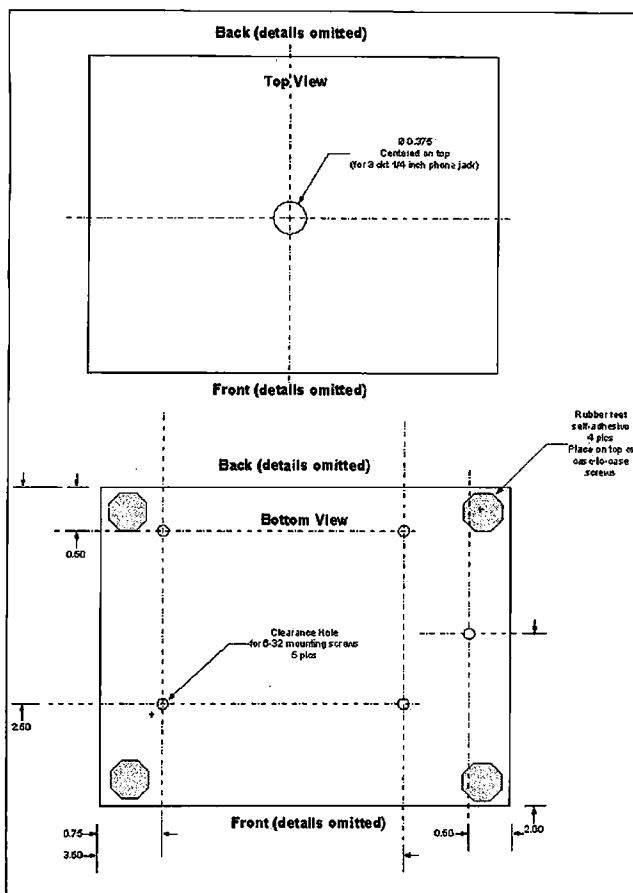


Fig. 7. Top and bottom layout.

The maximum capacitance is obtained by biasing D1-D4 at essentially zero volts, not the recommended minimum 1 volt. The lower bias won't damage the diodes, but manufacturing tolerances may prevent you from duplicating the maximum capacitance values I found.

this article, I'll identify sources for a few other uncommon parts.)

- The output transformer T1 should be trifilar-wound. Twist the three wires together, several twists per inch, and then wind T1. Follow the phasing connections as in the figure.

- The printed circuit board is drawn for the connections to come out through

## Constructing the tuner

I've prepared a printed circuit board layout for the loop tuner. If you use other building techniques, follow standard RF layout practices.

The construction is straightforward, with only a few areas of concern:

- I built the tuner in an LMB KAB-3432 die-cast aluminum box. A strong box is necessary because it supports the loop. RF shielding is important, so don't use a plastic cabinet.

- MVAM-109 hyperabrupt varactor diodes are getting hard to find, so the NTE-618 may be substituted. (Later in

an optional 10-position header. I just wired directly to the PC board for this project.

- The connection between the board and the tip and ring contacts of J1 should be made with two wires twisted together. Keep this connection as short as feasible.

- Use coaxial cable to connect J3 (BNC Out) to

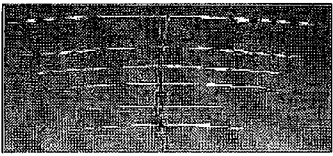
the output windings of T1. Solder the coaxial cable directly to the windings 3-Start and 3-Finish. Attach T1 to the board with glue after soldering the pins.

Next time: constructing the air core and ferrite core loops.

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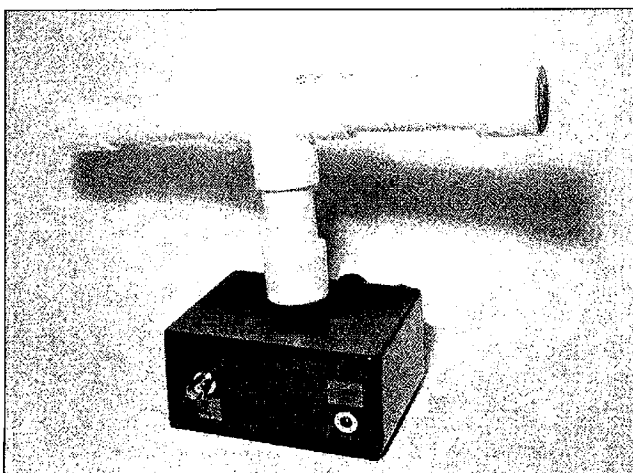


Photo F. Rear view of loop tuner with ferrite loop.

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# Ladder Crystal Filters for NBFM

*Some tricks of the trade from the OM who literally wrote the book.*

*Hams have used a ladder crystal filter in their home-brew radios because of the low cost to build one. Inexpensive microprocessor crystals, all of the same frequency, are used, along with some ceramic capacitors.*

There is no need to order specially made crystals of odd frequencies. Fig. 1 shows a schematic of a typical 6-pole lower sideband ladder filter. A typical frequency response is shown in Fig. 2.

The series resonant frequency of the crystals will fall partway down the lower frequency skirt. The parallel resonant frequency appears above the high frequency skirt. The filter bandwidth, as measured at the 3 dB down points, therefore, will be somewhat less than the difference between the series and parallel resonant frequencies of the crystals used in the filter. Fortunately, this difference is wide enough for amateur SSB use. Many fine ladder crystal filters have been designed with bandwidths in the range of 2.2–2.7 kHz.

Ham radio NBFM receivers need much wider bandwidths, wider than

the frequency difference between the series and parallel resonant points of typical crystals in the 2–16 MHz range. A 12.5 kHz bandwidth is ideal for amateur VHF FM use. So what can be done?

An equivalent circuit of a crystal is shown in Fig. 3. The series resonant frequency is determined by the motional capacitance,  $C_x$ , and motional inductance,  $L_x$ . The parallel resonant frequency is controlled by the series combination of  $C_x$  and holder capacitance  $C_h$ , along with  $L_x$ . The holder capacitance,  $C_h$ , in series with  $C_x$ , decreases the total capacitance, effectively placing the parallel resonant point above the series resonant point. As the holder capacitance is increased, for example by placing an external capacitor across the crystal terminals, the parallel resonant frequency is

decreased, moving it closer to the series resonant frequency.

Hayward points out in Reference 1 that the holder capacitance can be decreased by placing an inductor across the crystal terminals to “cancel out” the holder capacitance. He shows that a wider bandwidth filter can then be designed and built. A 3.5 kHz bandwidth 4-pole filter for AM use is described in his article. Can the technique be extended to 12.5 kHz and beyond?

The most general design equations for ladder crystal filters are given in Reference 2. A 10.7 MHz crystal, for example, will typically have a motional capacitance,  $C_x$ , of about 0.012 pF. If we assume we are designing a 6-pole Chebyshev lower sideband filter and that the holder capacitance is either 5 pF (typical), 2.5 pF (partially canceled), or 1 pF (nearly completely canceled), Table 1 shows the maximum bandwidth which can be designed. Three different values for the shape factor,  $1/\text{rov}3$ , are shown.

The bandwidth values in Table 1 can be used as a guide for selecting appropriate values for the shape factor  $1/\text{rov}3$ . Note that these figures are dependent on the actual series resonant

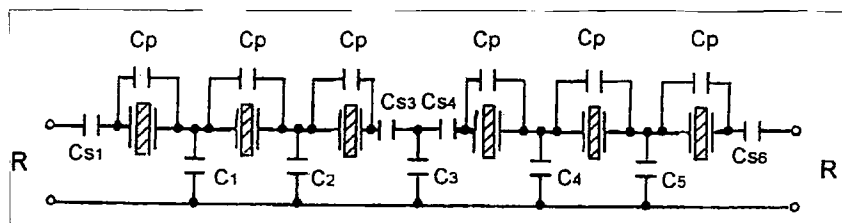
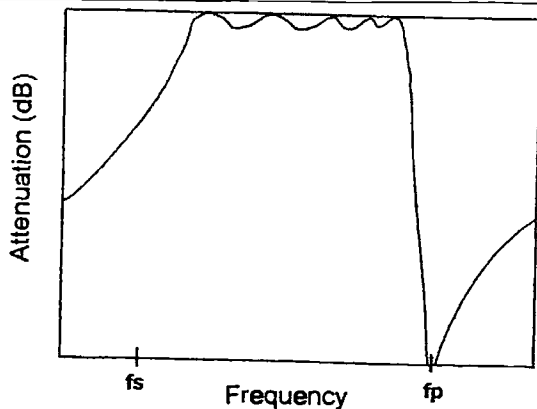


Fig. 1. Schematic of 6-pole ladder crystal filter — lower sideband.





fs = crystal series resonant frequency  
fp = crystal parallel resonant frequency

Fig. 2. Typical frequency response of circuit of Fig. 1.

frequency and motional capacitance of the crystals to be used. The figures also depend on the coupling coefficients of the filter type selected, e.g., 6-pole Chebyshev. See the appendix for more details.

#### Let's design a filter for NBFM

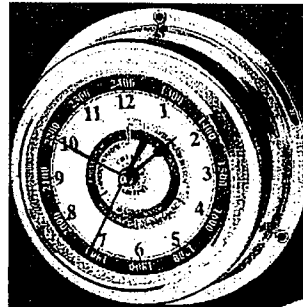
The first step an amateur takes in designing a ladder filter is to look in the junk box to see what crystals are there. I had exactly 6 crystals at 12 MHz left

		Ch (pF)		
		5 pF	2.5 pF	1 pF
Shape	5	4.0	8.0	20
Factor	7.5	2.9	5.8	14.5
1/rov3	10	2.26	4.5	11.3

Table 1. Bandwidth in kHz.

Component	Value
R	1441Ω
Cp	0.88 pF
Cs1, Cs6	13.5 pF
C1	10.1 pF
C2	13.5 pF
C3	14.0 pF
C4	13.5 pF
C5	10.1 pF
Cs3, Cs4	36.6 pF

Table 2. Component values for the ladder filter.



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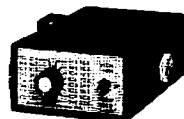
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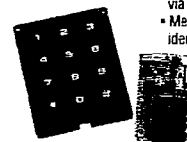
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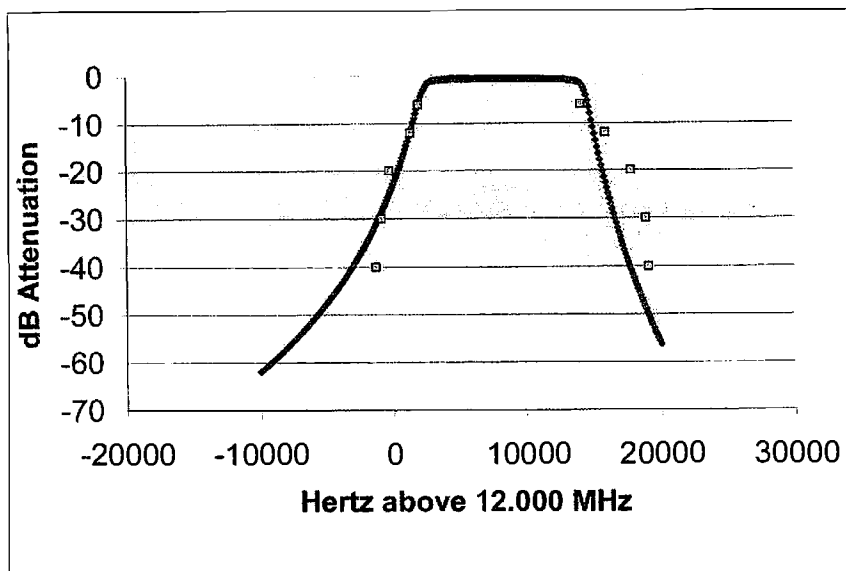


Fig. 3. Computed and measured responses of the filter of Table 2.

over from some earlier project. They were purchased from Digi-Key, part no. X428. They are 12.000 MHz series resonant in a HC49US can. This small can size is quite fortunate, as we will see in the construction of the filter. If you are going to buy the crystals, another good choice might be part number X423, a 10.738635 MHz series crystal in a HC49US can. The price for either crystal is \$1.56 each or 10 for \$12.96.

The crystal equivalent circuit must then be determined using techniques described in Reference 2. Sensitive RF voltmeter and step attenuator instrument kits used in making these measurements are available from Unicorn

Electronics, 1 Valley Plaza, Johnson City, NY 13790; 1-800-221-9454 or [www.unicomelx.com]. Test equipment for making very accurate measurements of capacitance and inductance is also described in Reference 3. For the 12 MHz crystals the equivalent circuit turned out to be  $C_x = 0.00952$  pF,  $L_x = 18.4769$   $\mu$ H,  $R_s = 20$  ohms,  $C_h = 3.73$  pF. Note that  $C_x$  was actually measured and then  $L_x$  calculated for exactly 12 MHz series resonance.

Design equations for a 6-pole .1 dB Chebyshev filter produced the component values shown in Table 2 for the circuit of Fig. 1.

The computed and measured response of this filter is shown in Fig. 3. For amateur NBFM such as used on the 2-meter and other bands, this is indeed a very fine response. The only problem is that the required parallel capacitance is less than the crystal's holder capacitance. An inductor will be required in parallel with each crystal to reduce the 3.73 pF holder capacitance down to 0.88 pF.

### The inductor

An inductance of 47.2  $\mu$ H will resonate with the 3.73 pF holder capacitance at 12 MHz to completely cancel the capacitance. Since we don't want a complete cancellation, but merely a reduction from 3.73 pF to 0.88 pF, a slightly larger inductance will be

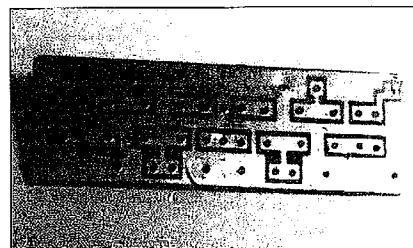


Photo B. Circuit board for the filter.

needed. Use of a larger inductor may not seem logical, but remember the inductor is in parallel with the holder capacitance. A larger reactance in parallel has less effect than a smaller one. The proper inductance value is determined after some calculating with the equation for resonance of an LC circuit.

$$f = \frac{1}{2\pi\sqrt{LC}}$$

An inductance of 64.4  $\mu$ H will be needed. This is provided by winding 28 turns of #24 copper wire on an FT37-61 ferrite toroid core. After winding, the turns are held in place with a coating of clear fingernail polish. Six identical inductors will be needed — one for each crystal.

The inductors may be checked using the instruments of Reference 3. Another way to check the inductors is to use an MFJ SWR analyzer. Connect an inductor in series with a 5.6 pF NPO capacitor and a 50 ohm 1/4 watt resistor across a BNC connector. Tune the SWR analyzer for minimum SWR and read the frequency. It should be about 8.4 MHz. The SWR will be about 3:1,

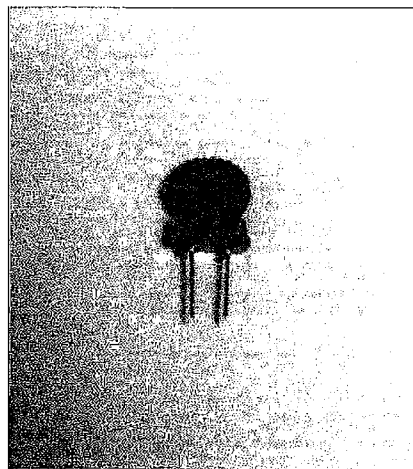


Photo A. Inductor connected in parallel with crystal.

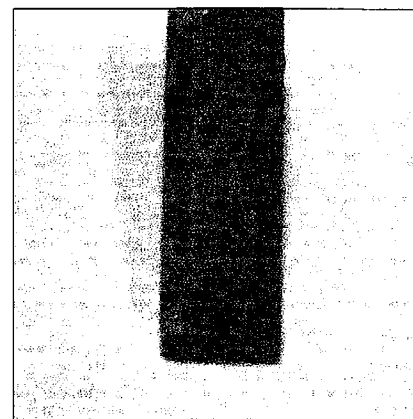


Photo C. Partially populated circuit board.



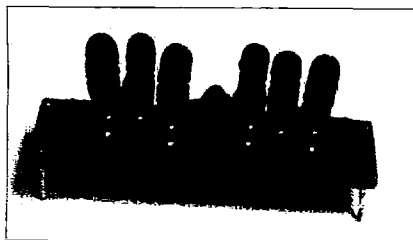


Photo D. Completed filter without cover.

indicating about 100 ohm series resistance for the coil. This converts to a Q of 32 at 8.4 MHz. The coils are then carefully connected in parallel with the crystals. See **Photo A** for details.

### Building the filter

All of the components for the filter are mounted on a 23/32-inch by 2-3/16-inch epoxy glass circuit board as shown in **Photo B**. Gold-plated pins for the filter terminals are mounted on 1/2-inch centers at each end. This allows the completed filter to be either soldered directly into a radio circuit board or else the filter can be plugged into two standard HC6 crystal sockets mounted 2 inches apart. An etched circuit board with gold pins attached and a black plastic cover are available as a kit for \$8.95 from Unicorn Electronics, part number 31-9960.

The capacitors are inserted first. **Photo C** shows a circuit board partially populated with ceramic NPO capacitors. The following values are used: For 10.1 pF, use 10 pF; 13.5 pF, use 10 pF and 3.3 pF in parallel; 14.0 pF, use 27 pF and 30 pF in series; 36.6 pF, use 33 pF.

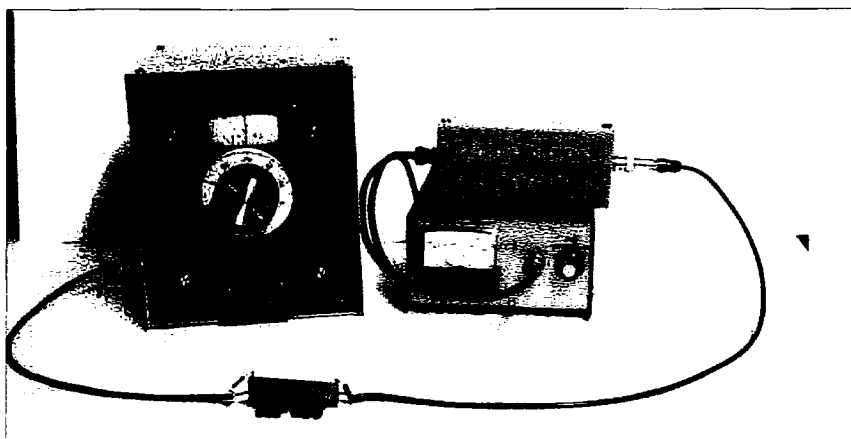


Photo E. Measuring setup.

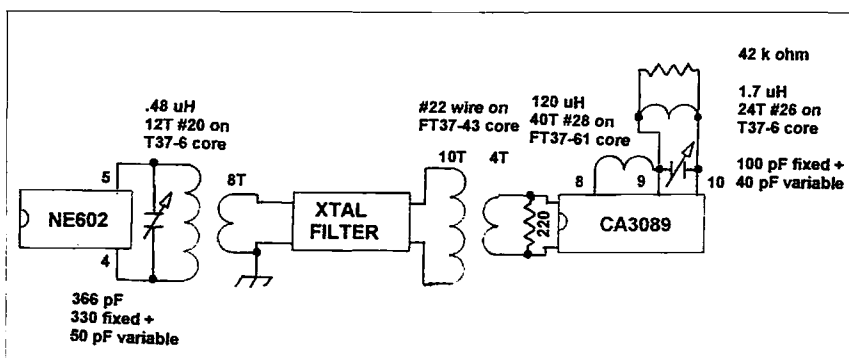


Fig. 4. Use of filter in a radio design.

Finally, the crystals with coils mounted on top are inserted. See **Photo D**. There will be just enough space inside the black plastic cover for these to fit if the crystals are in an HC49US holder. A standard HC49 holder with a coil on top would be too large for this cover.

For those who want to build narrow filters without parallel inductors, the circuit board and cover will work very nicely with standard HC49 crystals.

### Measure the passband

The filter must be properly terminated with 1441 ohms at both ends. A 1.2k ohm resistor in series with a 50 ohm generator at one end and a 1.2k ohm resistor in series with a 50 ohm RF voltmeter or step attenuator at the output will be satisfactory. A typical measuring setup is shown in **Photo E**. The measured results using this set up are shown as data points in the graph of **Fig. 2**.

### Using the filter in a radio design

This filter should be placed between the mixer and IF amplifier in your radio design. For example, in **Fig. 4** an NE602 mixer has a 3k ohm push-pull output. A high-Q tuned circuit provides rejection of spurs and images beyond the passband of the filter and also converts a 3k ohm push-pull to a 1441 ohm single-ended drive. At the other end, a broadband ferrite core transforms 1441 ohms down to a 220 ohm load placed at the input terminals of the IF amplifier-detector integrated circuit. This part has a very high gain and should not be connected directly to the high impedance output of the filter. A 220 ohm or lower value resistor is needed for stability of the integrated circuit.

Detection of narrow band FM at 10.7 MHz or higher requires a high Q inductor in the quadrature detector circuit. For 12 MHz, a T37-6 toroid core with 24 turns of #26 wire will have a Q of 190. Details of the detector circuit for a CA3089 quadrature detector are shown in **Fig. 4**. The circuit can also be used at 10.7 MHz by increasing the 82 pF fixed capacitor to 100 pF.

### References

1. Hayward, W., "Refinements In Crystal Ladder Filter Design," *QEX*, June 1995, pp. 16-21.
2. *Ladder Crystal Filters*, by John Pivnichny, MFJ, Starkville MS 1999. Also available from Barnes and Noble.
3. *Test Equipment*, by Guido Silva, Black Forest Products, Vestal NY 2001.

Continued on page 56



# Easy-Build Project of the Month

*How about this prototyping bench DC PS?*

*How many times have we needed to check out a component when building a small project or repairing a malfunctioning widget? Well, a few at least!*

This task, along with others, is the reason for developing a neat little power supply. My reason for designing this inexpensive DC power supply is for my prototyping activities. It is my opinion based on many years of being an electronics engineer that all circuits must be breadboarded to verify function and performance of the circuit — regardless of the builder's past experience and knowledge. Something we call Murphy's Law will always get you.

The "box" is small so that very little workbench space is occupied. This is definitely a most desirable feature of any piece of test equipment. There is no 120 VAC present in the box — again, a real nice feature. Let's take a closer look at what we have in terms of specifications.

The 120 VAC to low voltage AC is done with a wall converter transformer. This is the least expensive method of getting a safe 12 to 24 VAC

power source. The wall converters are UL- and CSA-approved and contain short circuit protection built into the case. This is quite a bargain at about \$3.00 each. In our case, we are looking for a converter that is in the 15 to 24 VAC range with a current specification of about 1.5 to 2.0 amps. This is in the neighborhood of about 10 VA or 16 watts. These devices are available from several sources including Hosfelt Electronics and Jameco Electronics.

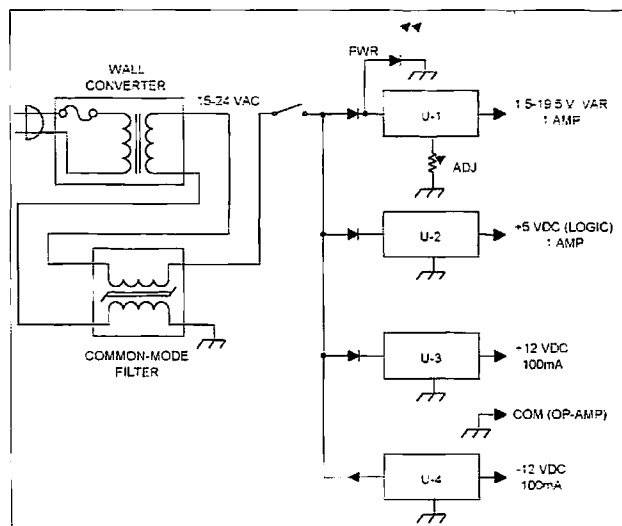


Fig. 1. Functional block drawing.

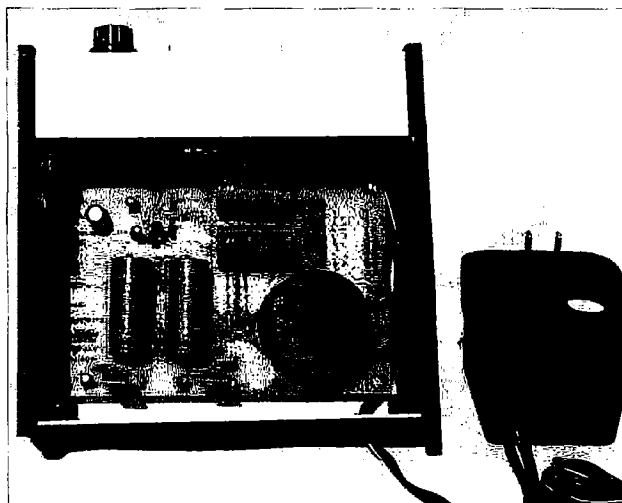


Photo A. The prototyping bench DC power supply, showing how the components are assembled inside the case.



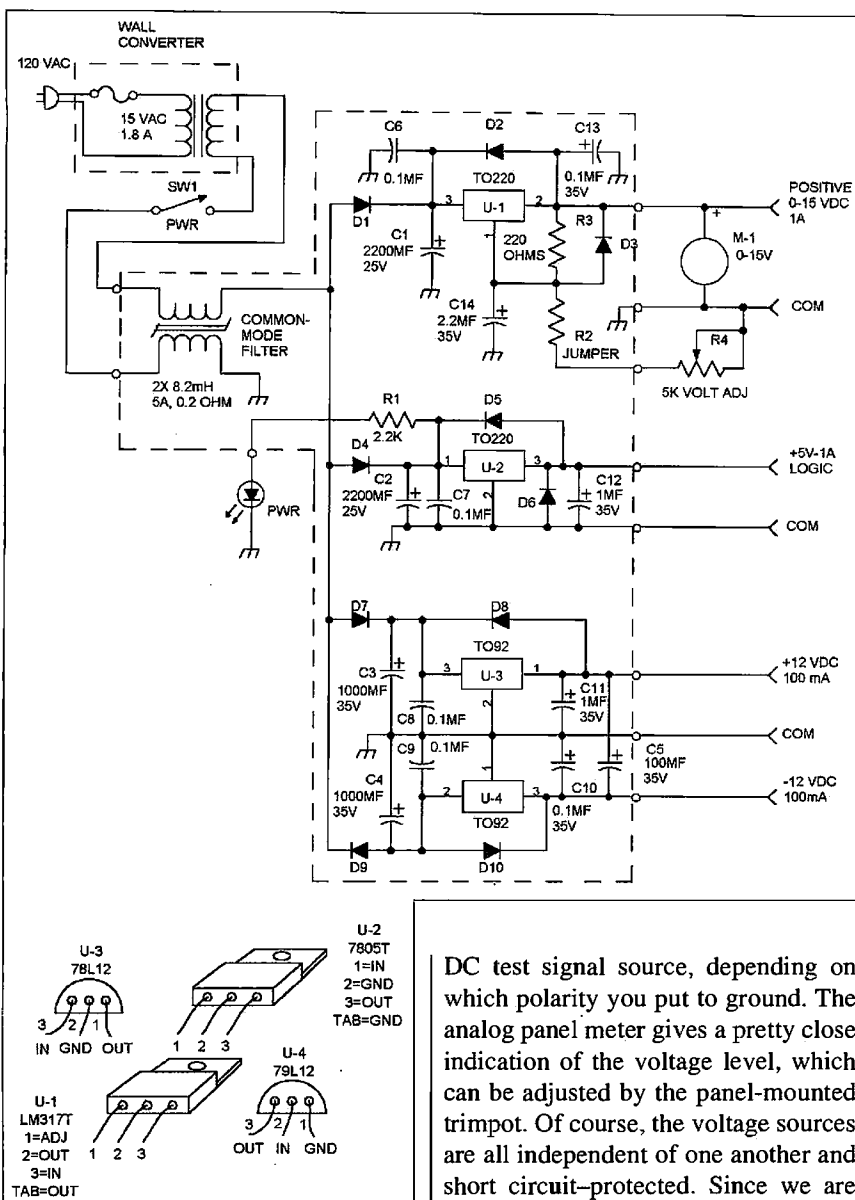


Fig. 2. Schematic.

Most do not have a center tap, so a little different approach has to be taken to get the plus and minus voltages.

Now that we have power to the enclosure, let's take a look at the functions and distributions in the box. Take a look at Fig. 1, which is a functional block drawing.

As can be seen, all operational amplifier and linear IC projects can be powered by this pair of voltages  $\pm 12$  VDC at about 100 mA. The 5 V at 1 amp supply is for all of those digital experiments and breadboard developments. There is the variable supply which provides the 0 to 20 VDC( $\pm$ )

DC test signal source, depending on which polarity you put to ground. The analog panel meter gives a pretty close indication of the voltage level, which can be adjusted by the panel-mounted trimpot. Of course, the voltage sources are all independent of one another and short circuit-protected. Since we are using the supply to develop circuits, a stable load-to-line regulation is needed and must be common-mode noise-free. The line-to-load regulation is done by the semiconductor manufacturer's well-designed monolithic IC regulator. The line filter design is up to us.

Now, the filtering is always a little bit of a problem but the good news is that common mode is where most of the potential problem exists. This is especially true with digital logic circuits. We want to keep noise from entering the 120 VAC line as well as keep AC line noise from appearing on the DC power supply outputs. We can take care of this with a 400 HZ low-pass common mode toroid choke. A company by the name of Pulse Engineering, Inc.,

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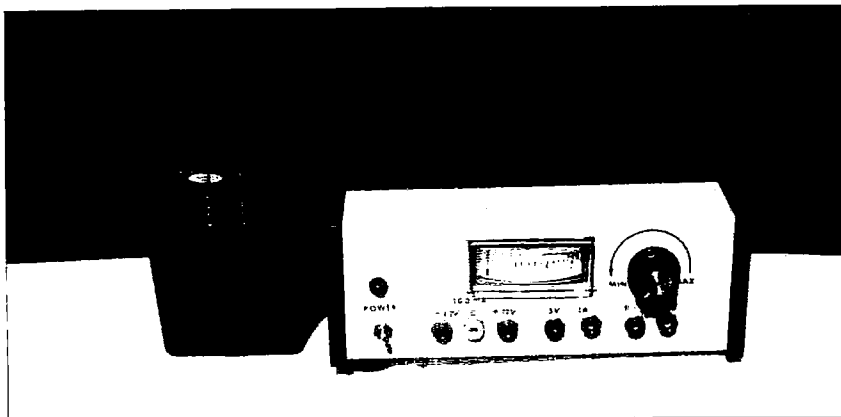


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**Photo B.** This small, attractive box has a very professional appearance.

makes a good device which is rated at 250 VAC 5 amps with a 200 milliohm dual 8.2 mH inductor. This is a bifilar-wound encapsulated epoxy-filled unit

measuring about two inches in diameter. It is designed for PCB mounting and has a center hole that can be used with a nylon screw and nut if you desire.

Qty.	Name	Description	Source	Cost
1	T1	15 VAC 1.5A wall converter	Hosfelt 56-781	\$ 3.00
1	SW1	SPDT toggle switch (2-pos.)	Jameco 75969	1.15
1	L1	Dual 8.2mH choke (PE #96180)	Hosfelt #8-129	.35
10	D1-10	1N4004 rectifier diodes	Jameco 177640	.50
1	U1	LM317T adj. volt. reg. TO-220	Jameco 51334	.29
1	U2	L7805T 5V 1A volt. reg. TO-220	Jameco 51262	.29
1	U3	LM78L12 12V 100mA volt. reg. TO-92	Jameco 51203	.19
1	U4	LM79L12 neg. 12V 100mA volt. reg.	Jameco 51431	.22
2	C1, C2	2,200 $\mu$ F 35V electro axial cap 16x30mm	Jameco 93657	2.18
2	C3, C4	1,000 $\mu$ F 35V electro axial cap 13x26mm	Jameco 93649	1.38
1	C5	100 $\mu$ F 50V electro radial cap 8x11mm	Jameco 29962	.07
4	C6-9	0.1 $\mu$ F 50V mono cap	Jameco 25523	.52
4	C10-13	1 $\mu$ F 50V electro radial aluminum cap 4x5mm	Jameco 94160	.52
1	C14	2.2 $\mu$ F 50V electro radial aluminum cap 5x11mm	Jameco 93729	.07
1	R1	2,200 $\Omega$ 25W CF 5% resistor	Jameco 30314	.05
1	R2	Wire jumper	—	.00
1	R3	220 $\Omega$ 25W CF 5% resistor	Jameco 30470	.05
1	R4	5k linear pot panel-mt. 5%	Jameco 29196	.99
1	—	Knob 0.25 in. shaft	Radio Shack	.50
1	M1	15 VDC meter (Modutec used)	Flea market	2.00
7	J1-7	Pin jacks (Johnson)	Flea market	.70
1	PCB	Printed circuit board	FAR Circuits	12.00
1	ENC	Enclosure	Ten-Tec JW-7	14.00
1	G1	0.25 in. rubber grommet	Radio Shack	.05
1	LED	Red 5mm (T-1.75) 80mcd diode	Jameco 34745	.15
4	—	0.25 in. aluminum standoff #4 hardware	Jameco 133612	.68
Total				\$41.90

**Table 1.** Parts list.

These devices are available from Hosfelt Electronics for 35 cents each and listed under part number #18-129 (PE-96180). I purchased several for other projects I am designing.

Now let's consider the enclosure. I am partial to Ten-Tec's JW and MW series since they look real nice and stack well. The enclosures come in widths from about 4 inches to 12 inches wide and from 2 inches to 6 inches high, with a depth usually in the 6-inch area. A request for a catalog will bring you all the info — the complete address appears at the end of this article. The costs are reasonable, usually in the ten to twenty dollar range. I chose a JW7 model at about \$14.00 + S/H, which worked out just fine. Decals, which are sometimes called "rub-ons," make a professional-looking box when sprayed with a light coat of polyurethane. These rub-ons may be purchased at any office supply store for a couple of dollars and give the homebrew projects that professional look. Now let's take a look at the schematic. The schematic reflects what is shown in **Fig. 1**, the functional block drawing. As can be seen, every thing is straightforward and simple.

Looking at the **Fig. 2** schematic, it can be seen that all of the components located within the dashed lines are what must be mounted on the printed circuit board (PCB). A list of components is provided in **Table 1**. The PCB is available from Fred KG9GX at Far Circuits, Dundee IL. Fred has graciously laid out the PCB using CAD and will provide PCBs at \$ 12.00 each plus \$1.50 S/H. The quality is good and it makes the project easy, eliminating any chance of incorrect wiring. An assembly detail is provided in **Fig. 4**. Make sure you observe polarity on the electrolytic and/or tan capacitors. The PCB comes with silk screen markings so that the placement of components should be easy. I highly recommend the PCB for this project.

The components are standard sizes and are available from several sources. The source and part numbers are provided along with the price I was charged at the time of building. When the PCB is complete and checked out,



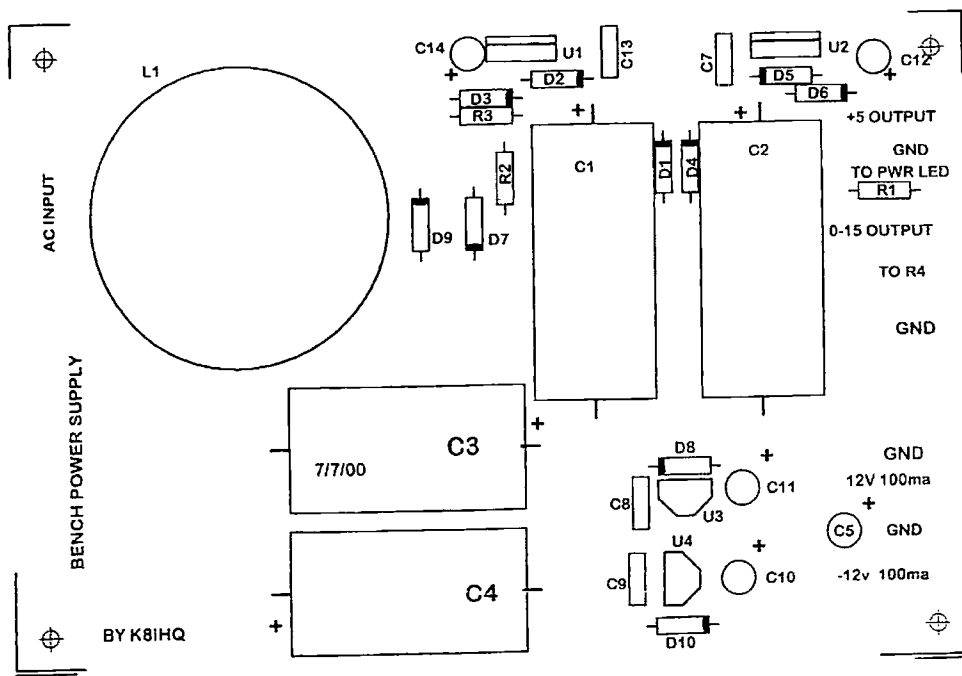


Fig. 3. Component layout.

it can be mounted in the enclosure using four 0.25-inch-high aluminum standoffs with #4 hardware. If the PCB assembly is mounted in the enclosure with U-1 and U-2 to the rear, attachment to the enclosure rear panel can be

done, thus providing extra heat sinking. Be sure to understand that U-1 must be insulated from the rear panel since it is "hot." This is usually done with a TO-220 insulator and some silicone grease. I did not find heat sinking

necessary, since I did not expect to come close to the 1 amp limits of the regulator IC.

One thing to be aware of is the

*Continued on page 56*

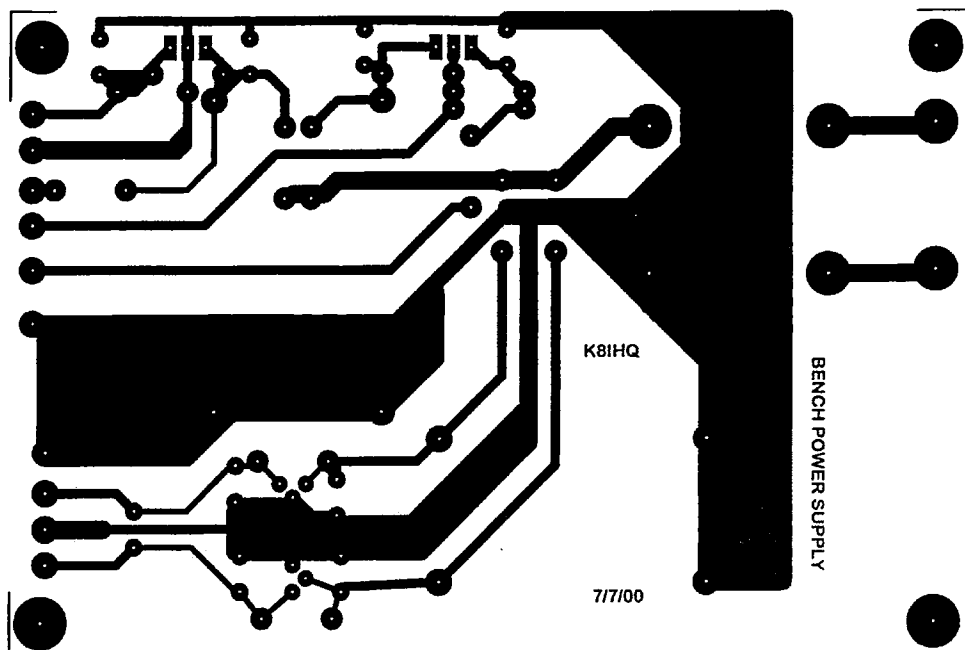


Fig. 4. PCB, foil side view.



# Tesla's Champions

*Everybody should have some supporters like these.*

*Technological advances are happening at an ever increasing rate, and we seem always to be looking forward, which is good, but would it not also be uplifting to look back and acknowledge — even pay homage to — the pioneering spirit of those whose efforts laid the foundation for all the technological advantages we enjoy today?*

Our schoolbooks, teachers, and professors seldom mention these pioneers ... if indeed the latter two know anything of their existence. Further, many historians and book writers have elevated the names of entrepreneurs and technologists for discoveries made by early pioneers, and if we are not more mindful, our historical heritage will be lost forever.

## Introduction

In the 1988–1989 school year, my students commissioned a bust of Tesla to donate to a large museum, any large museum. After discovering that the Division of Electricity and Modern Physics section of the National Museum of American History made no recognition of Tesla, we offered our bust. The Smithsonian curator promptly refused our offer, stating that he had no use for it. Later we discovered that the curator was displaying a bust of Edison alongside Tesla's induction motor. He also displayed photographs of the Niagara Falls power plant next to one of its original generators. A large brass inscription plate listed Tesla's patents, but there was no reference to Tesla. In the middle of the display stood a life-size

replica of Thomas Edison with the caption, "While the Niagara AC plant was being built by Westinghouse, Edison was busy with other important things." The caption did not explain what these "other important things" were, nor why this was relevant to the Niagara AC power plant. I then decided to enlist my third-graders to write letters, sell T-shirts, and raise money for donating Tesla busts to as many major universities and institutions as possible.

This article will tell my experiences in our nearly 20-year-long campaign to reintroduce Tesla to the academic community.

## Third- and fourth-graders vs. the Smithsonian Institution

I have a story to tell you about my successive classes of third- and fourth-grade students whose efforts are focused on preserving Tesla's memory in history. Along the way, my students somehow learn to write ... and enjoy their newly acquired skill. Is this not one of the grand purposes of school? Our class hero is Nikola Tesla because he is the underdog of electrical history, yet his scientific discoveries brought us the prosperity we enjoy today.

This is our incredible story of how my students are making their mark on history for Nikola Tesla. We are not talking about an obscure inventor lost in history, nor are we talking about a mad scientist who performed magic. Nevertheless, in the nineteenth century when he made his early discoveries, they may have seemed like magic. We are talking about a man whose major scientific gifts to the world (of AC power transmission and radio), more than anything else, caused a Second Industrial Revolution. How else can one explain the meteoric advance of science from the horse-and-buggy days of 1895, when the Niagara Power Project adopted his polyphase AC power system ... to his invention of radio ... to when, a mere 74 years later, man walked on the moon? It just had to be Tesla who "invented tomorrow."

Trust me, it was not Mr. Edison's light bulb that caused this revolution, as the Smithsonian Institution wants everyone to believe; it was Tesla's AC motor, his polyphase AC power transmission of electricity, and his invention of radio. His AC motor brought unprecedented mechanical power to industry; his AC power distribution



system made electrical energy available everywhere; and his radio communication system allowed us to communicate ideas with each other.

Is it not an absurdity that this great genius is virtually expunged from history in our country? It is more than that; it is a national disgrace!

### Tesla becomes our class hero

These students and others in my successive classes learn the true story of electrical history, not the politically correct version taught by a trusting but brainwashed educational system. When we learned that Nikola Tesla is the underdog of electrical history and is ignored by the Smithsonian, we made him our class hero and immediately started a campaign to secure his proper place in history.

### We acquire a bust of Tesla

After we learned the heart-wrenching story of Tesla's life and realized what a great man he was, we wanted to tell the world about him. We wrote many letters to important people asking for their support. Then a former student and her father approached me one day. She said she had persuaded her father, an accomplished sculptor, to create a bust of Tesla for our class, but we had to pay for the materials. The sculpture is bronze, mounted on premium-grade solid granite imported from India. It's appraised value is \$6,000. The plaque reads as follows:

NIKOLA TESLA  
1856-1943  
HIS NAME MARKS AN EPOCH

IN A SINGLE BURST OF INVENTION HE CREATED THE POLYPHASE ALTERNATING CURRENT SYSTEM OF MOTORS AND GENERATORS THAT POWERS OUR WORLD. HE GAVE US EVERY ESSENTIAL OF RADIO, AND LAID THE FOUNDATION FOR MUCH OF TODAY'S TECHNOLOGY.

### Writing letters

Cursive handwriting is normally introduced in the third grade. Now our

classwork had a purpose — writing letters to raise money for our Tesla bust. Many important people responded with generous checks to support our campaign. We even received a check from the president of Sony Corporation in Japan. (At the risk of appearing boastful, my students' letters ARE outstanding.)

### Rejected

When we offered our finished bust to the Smithsonian, Dr. Bernard S. Finn, Curator of the Division of Electricity and Modern Physics, refused us, claiming he had no use for it.

### Teacher travels to the Smithsonian to investigate rejection

When I visited the Smithsonian to learn why Dr. Finn had no use for our Tesla bust, the reason became indelibly clear. Please remember, at this time I was still naive about the Smithsonian's bias against Tesla — that is, until I saw a bust of Edison next to the invention that revolutionized the world — Tesla's rotating magnetic field device, which gave us polyphase AC and the AC motor. Tesla's U.S. patent number was on his invention, but I could not find any recognition for Tesla.

### A pathetically comical excuse

When I asked Dr. Finn why he had placed Edison's bust on display next to Tesla's invention, he said, "The sculptor was a phrenologist and wanted to examine the bumps on Edison's head; this makes our display authentic."

### Money buys history at the Smithsonian

The entire electrical display at the Smithsonian (including their Web site) focuses on Edison's brief business enterprise, which failed. This is not a story of invention, but of big business. Edison used Direct Current (DC), a technology invented and developed by others — before his time — as a means of powering his incandescent lamp. Big business and the gullible media have exaggerated this story so much

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that now everyone believes Edison is the father of our system of electrical power.

### Other evidence of deception and omission

I began looking through various Smithsonian publications, and what I found was astonishing. *The Smithsonian's Visual Timeline of Inventions Book* cites Rubik's cube, the electric toothbrush, and the pop-up toaster, but it fails to list the AC motor. Tesla is not even listed in the index. Further, they credit the invention of radio to Guglielmo Marconi: "1895 ... After reading the scientific writings of Heinrich Hertz, 20-year-old Italian Guglielmo Marconi invented radio communication." The Smithsonian ignores Thomas Commerford Martin's biography of Tesla published in 1894 describing Tesla's demonstration of radio transmission in 1893. The Smithsonian also ignores the U.S. Supreme Court's decision upholding

Tesla's patents and rejecting Marconi's patent for the invention of radio.

Dr. Bernard S. Finn is curator and first author of *Lighting a Revolution*, a Smithsonian publication. In his section titled "The Beginning of the Electrical Age," he names 43 contributors to the science of electricity. Mr. Edison's name is cited many times along with his photographs, but Nikola Tesla's name is omitted. Equally outrageous is the Niagara Falls power station picture of Tesla's AC generators on the last page ... and Dr. Finn's concluding remark: "When the Niagara Falls power station began operating in 1895, it signaled the final major act in the revolutionary drama that began in Menlo Park in the fall of 1879."

By this time the totally brainwashed reader is led to believe that our electrical world started with Mr. Edison at Menlo Park; then Edison finished electrifying America in 1895, by creating the Niagara Falls power station. Yet it was Tesla's U.S. patents that were used in that power plant's creation,

and Edison had no role in the project whatever. Edison actually fought the adoption of AC bitterly by waging his infamous "War of the Currents," culminating in his creation of the first electric chair. Yes, it was Thomas Edison and his crew who invented the electric chair to frighten people away from the use of Tesla's AC system of electricity.

### The students fight back

Education is the only way to combat the Smithsonian's wrongful depiction of electrical history, but we cannot hope to match the millions

of dollars industry and the Edison Institute spend promoting Edison's name. Nevertheless, I believe we can make a significant impact on many of our country's future physics and engineering students by donating busts of Tesla to our major universities.

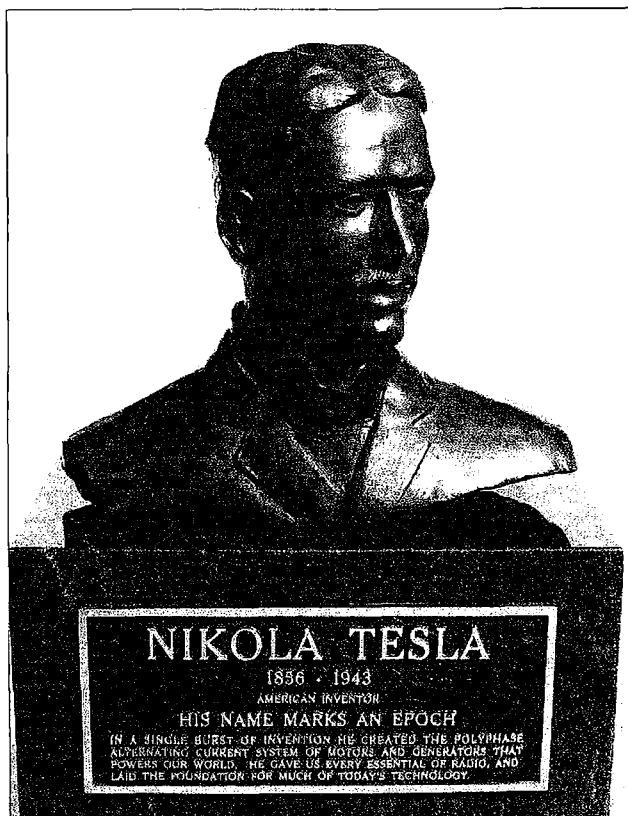
People universally recognize that a sculpture is an acknowledgment of one's greatness. Inasmuch as the academic community essentially forgot Tesla for a century, we believe a good first step is to reintroduce him to the students and faculty of our major universities.

My students intend to continue learning about Tesla, writing letters, selling T-shirts, and donating his bust to major U.S. universities. Soon we will also have 18" x 24" framed educational posters to donate to selected schools. For Tesla T-shirt ordering information, contact me via E-mail at [jwwagner@concentric.net]. So far we have donated busts of Tesla to ten major universities: Harvard, Yale, Princeton, MIT, Caltech, University of Michigan, University of Wisconsin, University of Maryland, Purdue University, and the University of Illinois — all made possible by donations and the sale of our T-shirts, but we need continued support from all who understand and appreciate our efforts.

### Official statement from Smithsonian Institution

Some selections from the PBS (Public Broadcasting Station) interview with Bernard Finn (Curator, Div. of Electricity and Modern Physics, National Museum of American History, Smithsonian Institution) regarding Tesla's legacy can be found on [http://www.pbs.org/tesla/dis/finn.html]. It is also interesting to include a few of Dr. Finn's comments, also presented on the PBS Web site on Tesla, regarding John Wagner's claims [http://www.pbs.org/tesla/dis/responses.html]:

QUESTION: John W. Wagner claims that the Smithsonian has deliberately minimized Tesla's contributions to electrical science. According to Wagner: "Its curator essentially credits Edison for our worldwide system of



**Photo A.** This valuable bronze bust of Nikola Tesla, appraised at \$6,000, is being donated to major universities by W8AHB and students in his classes.



electricity. He also credits Marconi for the invention of radio. This is a deliberate assault on factual history and needs to be challenged." Is Wagner's claim correct? What might the motivation be for the Smithsonian to credit others with Tesla's inventions?

FINN: ... John Wagner has made several statements about the historical role of Nikola Tesla, about the Smithsonian's treatment of Tesla, and about Mr. Wagner's communications with the Smithsonian. Not surprisingly, my views are somewhat different from his.

John W. Wagner's rebuttal to Bernard S. Finn's remarks: I believe Mr. B.S. Finn is a fine gentleman. He is also skillful with words; I was almost beginning to believe him. Nevertheless, close examination of his rebuttals reveals more than a casual reader would notice. Please consider the following analysis:

FINN: There is little question but that Tesla was a genius, whose fertile mind generated a number of ideas at the cutting edge of the electrical technology of his day.

WAGNER: Dr. Finn creates the impression of giving praise for Tesla's work. Nevertheless, close examination of his statement shows that he does not cite any of Tesla's accomplishments. Instead, he states that Tesla "generated a number of ideas at the cutting edge of electrical technology." In short, Dr. Finn lacks specificity — not only in his letter but in his displays.

FINN: Tesla was a loner. He had difficulty working with other engineers — whether in explaining his ideas to them or in considering their criticisms.

WAGNER: Many great historical figures were loners. Galileo, Copernicus, Van Gogh, and Goddard were laughed at and even persecuted for their ideas, yet they persevered in their singular direction. Did this make them any less worthy of recognition?

FINN: He had difficulty working with other engineers — whether in explaining his ideas to them or in considering their criticisms. The unfortunate consequence of this was that his impact on practical technical developments was severely impaired.

WAGNER: Dr. Finn fails to consider the opposite ... that the engineers created the problem by their faulty comprehension of his work. Dr. Finn also fails to explain exactly how "practical technical developments were severely impaired." Again, specificity is lacking.

FINN: This does not make him less interesting; indeed, for those of us who

are concerned with the roots of creativity it makes him, if anything, more so. But it does mean that we should be careful in what we claim were the consequences of his activities.

WAGNER: We are in agreement. Tesla was a more interesting scientist

*Continued on page 28*

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## Tesla's Champions

*continued from page 27*

than many of his contemporaries, and he was also at the root of creativity. Indeed, "we should be careful in what we claim were the consequences of his activities." The scientists who comprised the Electrotechnical Conference in Munich were no doubt mindful of this admonition when they elevated his name to stand alongside only 14 other great discoverers worldwide, a recognition outside the scope of Mr. Edison's ability ever to achieve.

FINN: Tesla's concept of the rotating field was clearly innovative and was recognized as such by George Westinghouse when he negotiated to purchase the patents in 1888-9. But to claim, in Mr. Wagner's words, that "he created the polyphase alternating current system of motors and generators that powers our world" ignores contemporary European systems that relied on the work of Pacinotti, Brown, Dobrowolsky, Wenstrom, and also Westinghouse engineers who, with Tesla's help, translated those patents into practical electrical "technology."

WAGNER: Dr. Finn is correct in stating that "Tesla's rotating magnetic field was clearly innovative," but to compare his work with Westinghouse engineers and other technologists is like comparing DNA to crankshafts. While acknowledging that George Westinghouse recognized Tesla's great discovery and bought his patents, Dr. Finn fails to acknowledge that Thomas Edison fought the adoption of the rotating magnetic field principle, the central part of Tesla's polyphase AC system. Further, he does not explain why Mr. Edison's failed entrepreneurial experiment in promoting DC technology is the vanguard of the Smithsonian's electrical display.

FINN: ... It also ignores the complexity of the history of electric power systems. A starting point might arguably be the development of the self-excited dynamo in the 1860s (Siemens, Wheatstone) which was efficient enough to make lighting and power systems (both AC and DC) practical, especially with better magnetic design in the 1870s (Gramme and others). That

made it feasible for arc lighting, incandescent lighting, street railways, and other applications to become widely available. The AC transformer in the mid-1880s (Gaulard, Gibbs, Deri, Blathy, Zipernowski) made possible long distance transmission (though this could also be done, with less efficiency, for both AC and DC using motor-generator sets). Multiphase AC operation, with which Tesla is associated, made transmission more efficient; it also gave us an AC motor. More recently, development of means for transforming DC has meant even more efficient means of long-distance transmission at very high voltages."

WAGNER: Dr. Finn continues to identify evolutionary anomalies that occur throughout all scientific investigations. They do not remain unmodified very long because they are not practical. Therefore, it is only logical to ignore the complexities of interim evolutionary phases that occurred in electrical investigations; the only place they belong is in laboratory notebooks. Tesla's polyphase AC system has been the standard of the world for more than 100 years. Dr. Finn's statement that Tesla was "associated" with multiphase AC operation is another example of an understatement. Tesla *created* the "multiphase AC operation," which is still in use today. Further, it was Tesla's AC motor that provided the real impetus for the explosion in industrial development throughout the world. Dr. Finn has not acknowledged this fact, nor has he evaluated its effect on civilization. While Messrs. Gaulard and Gibbs are credited with the invention of the transformer, they did not envision, nor did they receive patents for an entire system of polyphase AC transmission from the power station to its ultimate destination.

FINN: Incidentally, Edison's role in this particular sequence is modest, being confined primarily to the design of a more efficient DC generator.

WAGNER: Mr. Edison's role in power technology was not even modest; it did not exist! Zénobe T. Gramme and Friedrich von Hefner-Alteneck had perfected the DC generator in 1872, long before Edison borrowed

their technology to make his Pearl Street generating station. Later, Tesla made improvements in DC transmission when he worked for Edison. Then when Edison failed to compensate Tesla financially for his work in this area, Tesla left Edison's employ.

FINN: Tesla is given credit by Mr. Wagner for "every essential of radio." This statement is presumably based on his patents for basic tuning concepts. Eventually the U.S. Supreme Court held that these, together with patents of John Stone Stone and Oliver Lodge, anticipated those of Marconi. But Tesla was ineffective in promoting any system of his own; and although it is intriguing to think that his work may have had a significant impact on others, good historical evidence of that is lacking. Starting from the experiments of Hertz, it was Marconi, Stone, De Forest, Fessenden, Braun, among others, who developed practical radio technology. They were aware of some of the details of what Tesla was doing, but, as far as we are able to discern, they came into their own basic ideas independent of him. We can therefore marvel at Tesla's early understanding and articulation of some important concepts, but should beware of extending him credit for everything that followed.

WAGNER: Dr. Finn's interpretation of my phrase, "every essential of radio," is flawed. In my first article on radio (December, 1995, *73 Amateur Radio Today*), that phrase was clarified by another phrase, "embryonic commencement of our present day technology." I made a clear distinction between science and technology. Dr. Finn's analyses and focus is usually based on technology. I disagree with Dr. Finn's portrayal of Hertz, linking him with known technologists. Dr. Hertz's work is clearly in the realm of science. Before technology can take over, an "embryonic commencement" must first be established. Maxwell, Lodge, Stone, and Tesla's work was also in the realm of science, not technology. It was their work that created that embryonic commencement of what

*Continued on page 57*



# Make Your Own VHF DX!

*Need a neat club activity?*

*It's one thing to wait for band openings to happen — and on VHF, they can be a long time in coming — but it's quite another to create your own. Why wait for an opening to happen?*

The Weathersfield Radio club participated in several band openings of both kinds, but the most fun happened when we created our own. Here are a few of the options we explored.

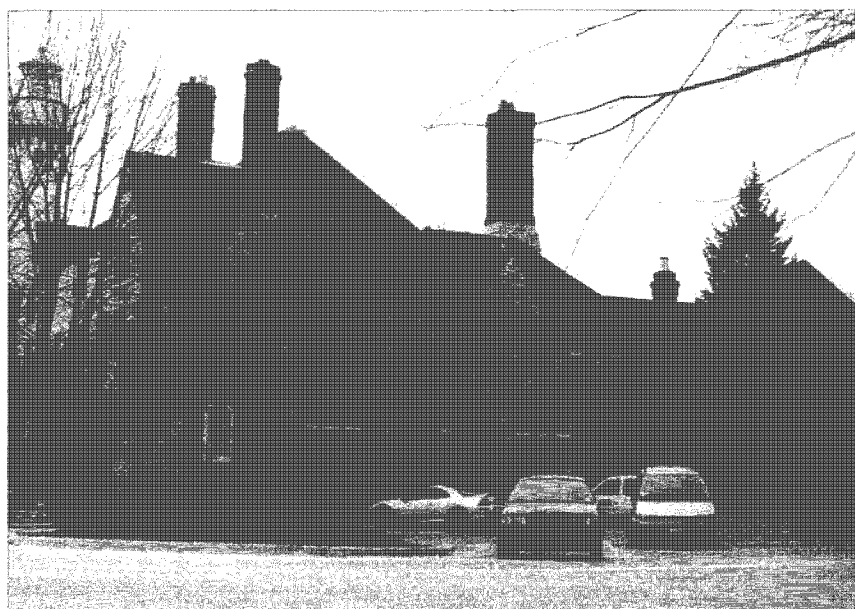
The first DX we got involved with on a proactive basis was aeronautical portable operation (no, not “mobile,” since we did not use mobile radios operating from on-board power with an antenna mounted to the vehicle, but “portable,” as in a hand-held transceiver with an independent power supply and its own antenna). With Rolf N9BRL volunteering his piloting skills and Cessna, I took both a two-meter and a 220 MHz HT up to about 3,500 feet. With just one watt and a rubber duck antenna, contacts were made into Chicago and northwest Indiana on simplex, while flying over the south central portion of Wisconsin.

Propagation and signal strengths were similar to what is experienced in base-to-land-mobile operation, but with a lot less power and antenna at one end. To confirm the propagation characteristics we noticed, we have since worked other aeronautical stations since then, with similar results —

another station coincidentally also flying a Cessna from Chicago to south central Wisconsin; a ham who was a passenger on a commercial jetliner at 5,000 feet landing in Kentucky (he had a window seat facing Chicago, and came in full-scale); and

the business jet that was owned by Amateur Electronic Supply in Milwaukee, Wisconsin.

In comparing two-meter to 220 MHz operation, Ken N9HDX and I noticed a very similar range between the two bands, with Ken quantifying it at about



**Photo A.** Lighthouse parking lot in Evanston IL. The elevation here is 15 to 20 feet above Lake Michigan. The building used to be the residence of the light keeper and family but is now a gallery for an art museum. Lighthouse can be seen at extreme left.







used in black and white film, and this was shielding incoming and outgoing RF.

One debate that's taken place in the club has been: Which helps range on VHF the most, antenna height, or simply getting the antenna height above the majority of the "ground clutter"? It seems that for every two people who are asked that question, there are twice as many answers — or opinions. We've managed to get a bit of proof for both. The proof of the second took the form of a mini-van, with a magnetic base and rubber duck antenna on the roof. The HT was driving a 15-watt amplifier. With this arrangement, it was possible to get from the Loop in Chicago into a northwest suburban repeater full quieting. Other tests seemed to confirm that this antenna did as well as a 5/8-wave antenna mounted at half that height (on the trunk of a car).

Proof that it's height and not just clearing ground clutter that helps range came in the form of a field test done in the parking lot of the lighthouse in

Evanston, Illinois. The parking lot is a good fifteen to twenty feet above Lake Michigan, and we went yet another ten feet above that to clear ground clutter (pedestrians, vehicles, etc.). For added advantage, we used a home-brewed five element 220 MHz beam made by Joe W9CYT/SK. Dave N9ZAZ ran the numbers through a computer program and calculated that the antenna had just slightly over 7 dB forward gain, with about 12 dB front-to-back ratio. With an Icom IC-38A running at maximum (although rated at 25 watt output, it was measured at 30), there was about 120 watts coming out of the front of the antenna.


In spite of all of these advantages, we were unable to get into our favorite repeaters in Michigan. On the plus side, though, we took advantage of the clear shot across the lake by shooting a signal down the coast southward into Indiana, and worked Bud N9WXY through KB9KRI/R on 224.12 MHz. We were not quite as successful toward the north into Wisconsin. Pointing the beam inland, we were able to access the

Crystal Lake, Illinois, repeater on 224.70 MHz with the radio in the 5 watt position, which we calculated as 40 to 50 miles (in this case, I wonder if a lack of ground clutter killed our signal across the lake, because it certainly helped while we were pointing the antenna inland!).

### Conclusion

While we may not have been able to find out what the exact methodology is for DX — a combination of the two mentioned? — the answers to our questions certainly seem to take second place to the fun of expeditions — all while proving that we don't need to haul a truck load of gear with us to do it.

### Final notes

Thanks to Christel Spies (as yet unlicensed) for help in the lighthouse expedition. Also, to Joe W9CYT, who passed away before he could take part in a 220 MHz expedition — although I'd like to think Joe joined us in spirit. I hope we did okay by you, my friend. 

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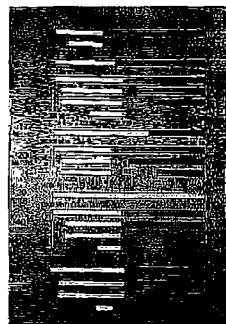
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# The 21st-Century Scrounger

*The end products justify the means — or something like that.*

*There are many ways to save money on electronics parts for your projects, but this article presents an interesting new approach.*

If you buy a 16-ounce drink at just about any restaurant, it doesn't cost twice as much as an eight-ounce drink. Similarly, it is cheaper to purchase a 100-aspirin pack than it is to buy two 50-aspirin bottles. There are two main reasons for this, one of which is of interest to electronics hobbyists.

First, it actually costs less for larger sizes because the total overhead is less for the manufacturer. With the drinks, for example, the restaurant has to pay only for one cup instead of two, and it takes less of the employee's time to fill a single cup, and so on. The second reason that larger sizes are less expensive

is that, in some cases, it is a marketing "gimmick" to get buyers to purchase more of something than they actually need. For example, there are not many nutritionists who would state that people need to drink 64-ounce "Big Gulps." The restaurants make money because people buy more than they need.

The first explanation is the one that is interesting to hobbyists. We can use this fundamental law of economics to our advantage when it comes to obtaining parts for our projects.

## An example

Let's start with something of an example. Suppose you decided to build your own alarm clock. You'd need to purchase a number of parts, the main ones being an enclosure, four 7-segment LEDs, a power cord, a transformer, and maybe a microprocessor to drive the entire device. **Table 1** shows how much it would cost to purchase those basic items from a national electronics distributor.

The main reason the cost is so high is that the electronics distributor has to do a lot of work to fill your order. Also, both the distributor and the original

manufacturer have to make a profit. The parts would be much cheaper if you would purchase a hundred or even a thousand pieces of each part you needed. The distributor's overhead would be less for each piece and he might even reduce his profit per piece a little to get a larger sale.

If you decided to really mass-produce this alarm clock, you would not even go through the distributor, but could purchase parts directly from manufacturers. This takes the distributor's profit out of the picture completely, further reducing your cost.

To obtain cheap electronics parts, an ideal way to do it would be to get the same type of cost as the larger manufacturers without having to buy in the same volumes. It is strange, but there is one way to do this: Buy their end products!

## Cheap electronic devices

When I say "buy their end products," I'm not at all implying that you should always purchase finished goods instead of building your own projects. This, of course, would go against everything electronics hobbyists attempt to achieve. We build things to challenge

Part	Cost
Plastic enclosure	\$3.34
7-segment LEDs (4 @ \$1.57 ea.)	\$6.28
Power cord	\$1.58
Transformer	\$7.65
Microprocessor	\$4.98
Total	\$23.83

**Table 1.** The basic parts needed to build an alarm clock, along with their associated costs if purchased from a national electronics supplier.



us and to get a sense of pride from constructing something. And many times, we build projects that have features not generally supported by current products on the market.

So why do I say "buy it"? Because so many electronics devices are so cheap these days, I've found it useful to purchase commercial products and then to disassemble them for their parts. It takes some work to do this, and there are some problems associated with it, but in general there are many more advantages than disadvantages.

Go back to the alarm clock example above. Instead of buying all the parts separately, you can purchase a complete alarm clock and disassemble it. It's a simple matter to keep the parts you need and then toss the rest. Looking at the difference in price between **Photo A** and the total parts cost of **Table 1**, you save about \$15 — even more when you add in the shipping and handling costs.

The alarm clock is just one example. If you look in the advertising supplements of most Sunday newspapers, you'll find an array of electronics devices that can be disassembled for useful parts. To give you a flavor for this, several examples are given in **Photo A**.

Need a low-speed, high-power 120 VAC motor? Buy an electric mixer and take it apart. Need a high-speed 120 VAC motor? A new hair dryer might be a way to go. Need a small speaker? Buy a cheap pair of speakers or even a "baby boombox" and disassemble them. When you're all done you will have paid about the same as buying the part via a distributor, with the added benefit of having all the other parts on the unit that can be saved for your next project.

## Enclosures

Of all the parts I've obtained with this method, the ones that are the most beneficial are the enclosures. For some reason, buying low-volume enclosures is an expensive proposition. Another drawback is that the end results of such enclosures don't look very professional. Going back to the alarm clock example, I'd much rather display my own clock design in an enclosure

from a scrapped clock than in one of Radio Shack's blue plastic boxes.

There is also the ability to get enclosures with just the features you'd like. If you need a keypad for a project, buying a calculator or a phone for the enclosure might make sense. Many of my projects are powered by batteries, so I'm always looking for good enclosures that have integrated battery storage compartments.

Here is another example. If there is anyone out there thinking about building a project that interfaces with the telephone system, perhaps you could look at using the shell of an answering machine as an enclosure. In most cases these enclosures would have a notch all ready cut out for the phone cord. They are also likely to have an opening for a DC power input — this could be used or not, depending on your project.

Here are some other tips for purchasing and using enclosures obtained via this method:

- Make certain you buy the enclosure first, and then design your project around it. This is the best way to make certain all your parts will fit into the box.
- Estimate a project's size on the high side if you're not sure how much room you'll need. I don't remember

ever having to start a project over because there was too much empty space in an enclosure.

• If you've ever taken something like a remote control apart, you know that most of the switches are just rubber cups that close two traces directly on the PC board. This is difficult to do with homemade PCBs. To get around this, you can place a flat PCB-mount switch in the switch's location.

• Most cases are plastic and their markings are generally painted on. To remove the markings for your project, try a solvent like paint thinner. If a marking will not come off, try strategically placing a label over it instead.

• Small holes can be covered with labels, too. Suppose you built a project from an IR remote control enclosure, but only needed one switch input. To cover the other 20-or-so holes, try another label. This one should be large enough to cover the entire face of the project — you'll find it looks much nicer than 20 separate labels.

There is one other twist on this method of obtaining parts that should be discussed — used electrical equipment. We focused in this article on disassembling new devices to get parts only because it is much easier and more meaningful to get the cost associated with these devices. All the same



**Photo A.** All the items shown here are good sources for cheap parts.



can be applied to used equipment. In fact, in some respects used equipment makes it even easier to get useful items. The reason is that most of today's devices are being built with surface-mount technology, making it difficult to desolder useful chips from the board.

## Music to your project

Once you get the hang of this type of parts "shopping," one thing is certain — you'll almost never purchase ICs to make any kind of sound. The reason is that there is an unimaginable quantity of sound chips on the market, and it is much easier and cheaper to obtain them by disassembling purchased items. In this case the phrase "purchased items" means one of two things: cards and toys.

Musical cards have become such a big hit that for about four bucks you can spice up your projects with every type of music from *Jingle Bells* to Elvis' *Love Me Tender*. Most cards come with the sound generation chip, a small piezo-electric buzzer as a speaker, a switch, and a small 1.5- or 3.0-volt button cell. All of these parts are salvageable, although in most cases you'll probably only use the first two.

Toys are even a more fertile ground for parts to recycle. Back in my day, the only soundmaking toys were See

'n Says, which were simple mechanical devices. Today's kids have toys that make all kinds of noises, and except for a few like the See 'n Says that are still sold, almost all of them use electronics to generate the sounds.

Here is a small sampling of what I found in my son's toy box relative to making sounds:

- A plastic camera that says, "Smile, please," when the shutter button is pressed.
- A car key chain holder with a four-button remote control that makes the sound of an engine starting, an angry sounding horn, an alarm, and the horn gently "tooting."
- A fire engine with horns and sirens.
- A space shuttle flashlight with three distinct phrases, such as "Watch out, we're entering the meteor field!"
- A telephone with dial tone, touchtone dialing, busy, and ringing sounds.
- An electronic book about trucks, with a variety of phrases such as "Ten-four, good buddy!"

There are many, many other sounds out there. When it comes to sounds, whatever noise or song you are looking for, the old adage is definitely true: Seek, and you shall find. Also, be sure to remember the advice of the last section — cheap toys can generally be found at garage sales.

## Drawbacks

As with anything that sounds this good, there are some downsides to this method of obtaining parts. First, many of the integrated circuits (ICs) used in today's electronics devices are not marked with part numbers, or in some instances even with the name of the manufacturer who built them. Even if a part is marked, it may well be a custom IC and hence there would be no way to obtain a data sheet for the part. All this makes it very difficult to get useful chips via this method.

The problem is not just limited to ICs. Many parts tend to be unmarked, and hence hard to use elsewhere.

Another difficulty is that special care must be taken to use an existing enclosure. Your PCB may need very specific mounting spaces in order to

work. Also, switches, connectors, and display devices all need to line up with their associated features on the enclosure — this can greatly limit your flexibility in designing the PCB. One way around this problem is to be sure to use the PCB that came with the enclosure as a layout template. As long as your board matches the production board, it will fit in the enclosure.

Finally, many of today's electronics are not assembled with good, old-fashioned screws. Many have complex arrangements of tabs and grooves, generally with an ample dose of glue or melted plastic to keep everything together. All of this makes it difficult to get into a device, let alone use the enclosure for something else. To this day, I have not found a good DC power adapter. When I find one held together with screws I'm going to put a five-volt regulator in there to power my projects. Keep watching — I'll write about it to give you the details.

## Last words

We electronic hobbyists like to build things for ourselves. So even if it takes \$25 in parts and 25 hours of time to design and build an alarm clock, it is worth it to us. We're not necessarily "in it" for the money, but rather other things — like the pride that comes with being able to say: "I built it myself."

To some, using a production clock enclosure for their own clock project might not seem like the "do-it-myself" attitude. But how is this any different than buying a rectangular enclosure from the parts distributor? The point is that you should use the best (and cheapest) enclosure that is suited for your project. It's like everything else in this hobby: You need to use the best part for the application. This should not detract from your ability to proclaim with pride: "I built it myself." 73

Part	Production Device(s)
7-segment LEDs	Alarm clock
Solar cell	Solar-powered calculator
120 VAC motor	Hair dryer, mixer, fan
120 VAC push-buttons or sockets	Computer power center
Voice recording IC	All-digital answering machine, Radio Shack "talking" picture frame
Laser diode	Laser pointer used for presentations
Stepper motors	Portable CD player, used floppy drive, old printers
Numerical LCD	Calculator
Alarm sounds	Children's toys
Musical ICs	Musical greeting cards

**Table 2.** Here is a list to keep for future reference. Whenever you need a part from the first column, consider buying the device from the second column to obtain it.

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# Travels with Henryk — Part 6

*Portuguese hospitality at its best.*

*My first and so far only visit to mainland Portugal was quite short. I did not even bring a radio with me. But on the other hand, I was fortunate to meet some outstanding amateur radio operators of Portugal.*

I phoned Jose CT1BOH (Photo C) who lives in Lisbon, the capital city. Jose is one of the best contest operators in the world, having spent some ten years traveling to exotic places and winning contests, breaking records both on CW and SSB. He is in his early thirties, but already by the age of 8 he was a competent radio operator. Born in Africa in a ham family, he grew up with amateur radio sounds in the background. His father was CR6RC, later to become CT1RB. When the family moved to Portugal, Jose was too young to get a license and had to wait several years.

Jose was very helpful and arranged a small meeting of a few local hams at the home of another Jose, CT1AOZ (Photo A). There were Arlindo CT1EGW and Luis CT4NH and Rui CT1AIC and Jose CT1BOH and of course the host, Jose CT1AOZ. Luis CT4NH has a well-equipped station and is quite active, mainly on SSB.

Rui CT1AIC lives in the same block of flats as Jose CT1AOZ but is mainly interested in digital modes. He was the first one in Portugal to transmit packet radio emissions.

Jose CT1AOZ (Photo B) has a

modest station, and because he lives in an apartment, his antennas are modest, too. Yet, he is quite successful in contest and DX-chasing. Readers who are a little older might remember Jose from his African activities as CR6HH in Angola and CR7JO in Mozambique. He moved to Portugal 21 years ago.

Another active amateur radio operator who moved to Portugal from Africa and whom I met was Santos CT1DVV (Photo F). He lives some 150 miles north of Lisbon in the historical city of Coimbra. Not exactly in the city; a few

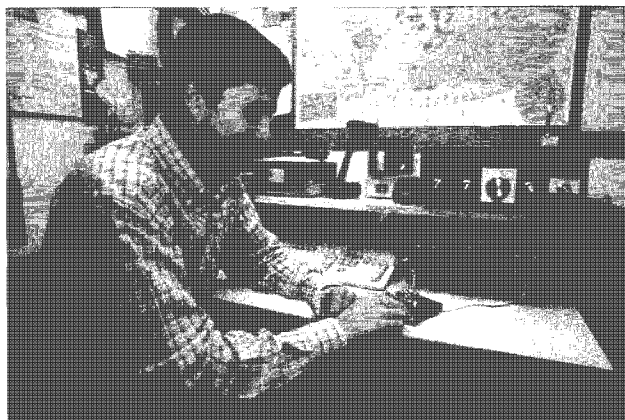


*Photo A. A group of amateur radio operators get together in Lisbon.*



*Photo B. Jose CT1AOZ in his shack in Lisbon.*





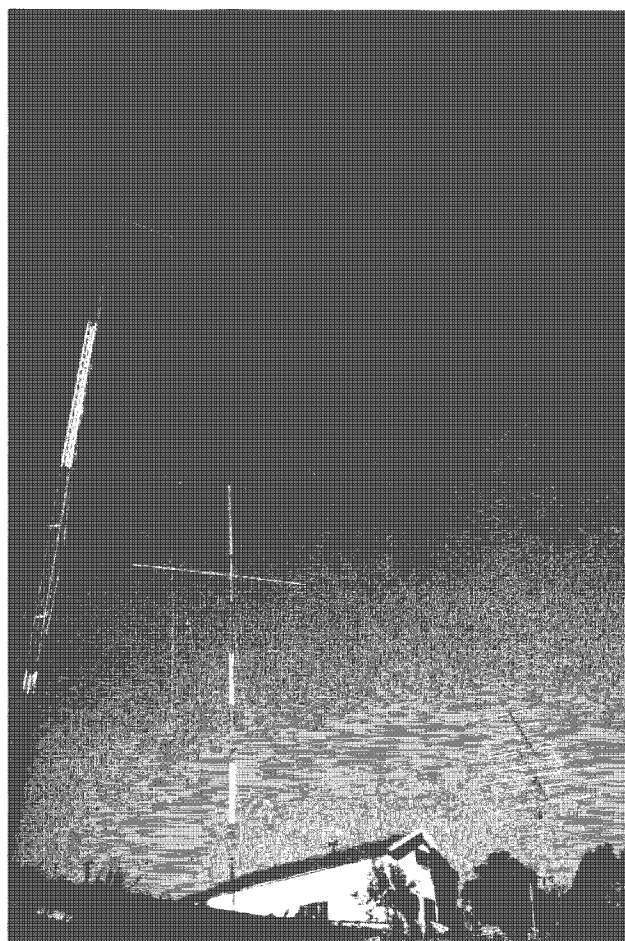
**Photo C.** Jose CT1BOH is one of the best contest operators in the world.

years back he moved out of town in order to be able to build large antennas and do serious contesting. He is very serious, and the antennas are impressive (**Photo E**). His station is in almost all major contests. Santos' son, Antonio CT1ESV, shares this hobby and the station (**Photo D**). They usually use the callsign CT8T in contests. Many foreign visitors have been here and have guest-operated this outstanding station.

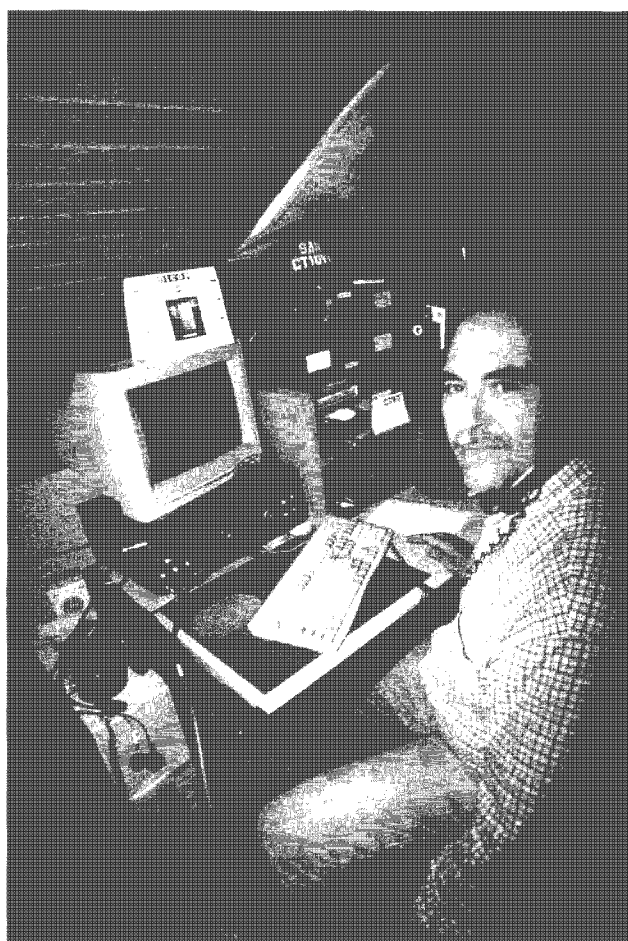


**Photo D.** Santos CT1DVV, who lives in Coimbra, shares this station with his son Antonio CT1ESV. You may have worked them in contests as station CT8T.

*Continued on page 57*



**Photo E.** CT1DVV owns some impressive antennas.



**Photo F.** Contester Santos working as CT8T.



# What Amateur Radio Means to Me

*Do you feel the same way?*

*I retired in August 1999. I had worked in the camera and photo supply business for 47-plus years. My customers were among the wealthy and famous across the southeastern United States and southeast Texas. An example is that I sold a Canon Elph 370Z to Gene Cernan, retired astronaut and the last man on the moon.*

I worked five years in Charleston SC, 11 years in Atlanta GA, five years in New Orleans LA, and 27-plus years in Houston TX. The best thing about New Orleans was that I met my wife Elsie there.

The interaction with 100 to 200 hundred customers a day both in person and on the phone, with fellow employees and the business owners, was important to me — it was what I lived for. At all these locations except Charleston, I was a store manager or had the title of “Marketing Manager.” Did I miss this when I retired? You bet I did! I was so depressed that I sought professional counseling. That was a big mistake — they kept me coming back for more sessions and more tests. In effect I was a “cash cow” that they didn’t want to loose.

My wife was the one who suggested amateur radio! She ordered from ARRL the 1997 edition of *Now You Are Talking*, and a *Pocket Code Tutor*, and a practice key from MFJ. That was what it took to get me started. I went to a VE session thinking that it would be a teaching session, not knowing that they were there to give tests. I took the Novice test and the Technician test, and not surprisingly, failed them both.

I decided that the only thing to do was to study on my own, not knowing that most of the amateur radio clubs had classes for new hams! I passed the Novice but again failed the Technician test. I ordered ARRL’s *RF and You*,

and with the information passed the Technician test. I passed the General test the first time I took it. I filled out a comment sheet in the back of the General manual and mailed it to the ARRL. They used a quote from it on the back of their new manual. I took a code class given by the Brazos Valley Amateur Radio Club, after which I could read and send 5 words per minute. The only other test I need to pass is the Extra class.

My station has

a Yaesu FT-814 transceiver, antenna tuner, and table microphone, and a Bencher key. Most of the other items are by MFJ. Power supply, antenna,

*Continued on page 57*



*Photo A. John R. Endsley, Jr. KD5IDU.*



## Great Gift Idea!

*Check out this LED super-system.*

*Here is a \$55 4-LED pocket white light system that may be an ideal gift for a friend or yourself on your next outing. It is especially useful in providing various types of lighting for just about anything you might encounter out on the road.*

The power-on mode illuminates four intensely bright white light-emitting diodes that can project a beam visible to the end of a football field. I was utterly amazed at how four little light-emitting diodes, barely taking any juice out of three common AA alkaline batteries, could concentrate a beam of light you would get with a big old heavy flashlight.

For map reading, the mode button gets you into a dim mode that adjusts 15 different intensities down to a faint glow. They do this by multiplexing the four LED lights — a subtle on and off of the lamps so quick that your eye cannot detect the microsecond off between on pulses. As you get down to relatively dim for in-vehicle map reading, you can still drop the intensity by one after another LED going out.

The little LED-Lite offers some attention-grabbing blinking, strobing, and pulsing patterns, and this might be a great way to draw attention if you decide to leave the light on to mark a specific object or overhang hazard on your next camping trip. It also has a neat circuit to automatically dim down the lights after a couple of minutes, and finally shut down the entire light system if you want a gradual time-out.

Another interesting mode is an extremely bright SOS distress signal. At first I thought this was a little hokey, but after I played with it at night, I saw its value by how intense the SOS signal was, and how easily it was recognized by three dots, three dashes, and three dots. It signals at a rate that almost anyone with basic Boy Scout training could read as a distress signal.

The LED-Lite system is submersible, and it keeps out water down to 100 feet. Yet if you ever needed to change the three common AA batteries, a little jeweler's Philips screwdriver is all that is necessary to remove the four screws and snap out and in the AA cells. If you use heavy-duty alkaline AA cells, the very brightest mode continues to pump out the lumens for over 50 continuous hours before things begin to get dim. If you regularly run the light in a normal light mode, you could leave it on for 200 hours continuously. Down at a very low light level, such as a level for reading a map out in the wilderness, the LED system is multiplexed almost always off, and you could get over 2,800 hours of usable map-reading light! This is one of the features of the white light-emitting

diode — when switched to less brilliance, there's no energy-consuming resistor in series with the lights, but rather the lights are multiplexed mostly off; and while you can't see that the light is cycling on and off, the view is dim light output and hundreds if not thousands of hours of useful map-reading lumens.

If you put a little plastic float on the lanyard that might hold the light, it won't sink in fresh water. In salt water, it is neutrally buoyant. A special lithium AA battery would keep it floating face up, to serve as an overboard marker in case of a boating accident on a lake or river. But best of all, think 100% submersible.

LED-Lite Company, based out of Chula Vista CA, continues to dazzle us with all sorts of unique LED-Lite products. But for the road and camper, their newest four-LED white light with dimming and flashing capabilities, plus underwater operation, is going to be quite popular. You can buy it direct from LED-Lite, 2400 Fenton St., Ste. D, Chula Vista CA 91914, tel. (877) 309-0530. You will *not* believe how much light comes out of such a very small package when you first turn it on, and it cycles up extra white bright. 73



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the October issue, we should receive it by July 31. Provide a clear, concise summary of the essential details about your Calendar Event.*

## JULY 6

**OAK CREEK, WI** The South Milwaukee ARC Inc. will hold its 34th annual "Swapfest" on Saturday, July 6th, at the American Legion Post #434 grounds, 9327 S. Shepard Ave., Oak Creek WI, from 6:30 a.m. until at least 2 p.m. CDT. Free parking. A picnic area and limited free overnight camping are available. Admission \$5 per person, includes "Happy Time" with free refreshments sometime during the day. For a free flyer with map, write to *The South Milwaukee Amateur Radio Club Inc., P.O. Box 102, South Milwaukee WI 53172-0102*. Talk-in on 146.52 simplex and on many of the local repeaters.

## JULY 12, 13, 14

**BRYCE, UT** The 2002 Rocky Mountain Division ARRL Convention and 2002 Utah Hamfest will be held July 12th to the 14th at Ruby's Inn, Bryce UT, near Bryce Canyon National Park. For more info please visit [[www.utahhamfest.org](http://www.utahhamfest.org)].

## JULY 14

**KIMBERTON, PA** The Mid-Atlantic ARC will present their annual Valley Forge Hamfest and Computer Fair, Sunday, July 14th at the Kimberton PA Fire Company Fairgrounds, Route 113, south of the intersection with Route 23. The hamfest will be held rain or shine. Sellers will be admitted at 7 a.m. and buyers will be admitted at 8 a.m. Admission is \$6. Unlicensed spouse and children of licensed amateur radio operator will be admitted free of charge. Lots of great door prizes will be available. Many dealers will be there selling amateur radio and computer gear. Demonstrations of various types will take place. Inside tables with electricity are \$10 each for 1 to 4 tables, \$8 each for 5 or more in addition to admission. Please E-mail Rick Miskinis N3AGS, at [[reservations@marc-radio.org](mailto:reservations@marc-radio.org)] or call him at 610-825-9590. Outdoor tailgate spaces are \$6 each in addition to admission on the day of the hamfest. Food and beverage sales are to be done by authorized vendors only. For additional hamfest info, please E-mail MARC at [[Hamfest-info@marc-radio.org](mailto:Hamfest-info@marc-radio.org)], or write to MARC, P.O. Box 2154, Southeastern PA 19399-2154. Info is also available on the club Web site at [<http://www.marc-radio.org>]. Talk-in on 146.835(-)

MHz and 443.800(+) MHz PL 131.8. Watch for signs which will direct you to the site.

**PITTSBURGH, PA** The North Hills ARC will hold its 17th annual Hamfest on July 14th, 8 a.m. to 3 p.m. at the Northland Public Library, 300 Cumberland Rd., Pittsburgh PA. The location is approx. 10 miles north of Pittsburgh on McKnight Rd., (Truck Route 19). At the 3rd traffic light after Northway Mall, turn left onto Cumberland Rd. Northland is on the left at the top of the second hill. From points north, take Route 19 south toward Pittsburgh. Follow the signs for McKnight Rd., and at the 4th traffic light turn right onto Cumberland Rd. If on Perry Highway, turn left onto Cumberland Rd. at the Sunoco. Talk-in and check-ins will be on 149.09 W3EXW, the North Hills ARC repeater. Free admission. Free parking. One free automobile-sized space per tailgater; each additional space \$5. Handicap/wheelchair accessible. Refreshments will be available. For more info contact *Joe Springer, 2601 Clare St., Glenshaw PA 15116*, or phone 412-486-1681. More info is also available on the Web site at [[www.nharc.pgh.pa.us](http://www.nharc.pgh.pa.us)].

## JULY 20

**CARY, NC** The Cary ARC will sponsor its 30th Annual Swapfest 8 a.m. to 2 p.m. at the Herb Young Community Center at the corner of Chapel Hill Rd. and N. Academy St. Exit 290 off I-40 onto Chapel Hill Rd. about 2.1 miles to N. Academy St. Advance tickets \$4, \$5 at the door. 6 ft. tables available for \$10 each. Limited power. Sellers can set up on 6:30 p.m. the day before, or 6 a.m. to 8 a.m. the day of the fest. VE exams begin at 10 a.m. Talk-in on 145.390. For tables or tickets, SASE to Cary Amateur Radio Club, Box 53, Cary NC 27512. You can find more info at [[WWW.QSL.NET/N4NC](http://WWW.QSL.NET/N4NC)].

**TEXAS CITY, TX** The Tidelands Amateur Radio Society Hamfest will be held July 20th, 8 a.m. to 3 p.m. at the Doyle Convention Center, 21 Street at 5th Ave. North, Texas City TX, one block south of the Jack in the Box. Free parking. Air conditioning. Swap tables, major vendors, VE exams, CW contest, forums and much more. Advance registration by mail is \$3 per person, \$4 at the door. No E-mail reservations. Swap tables \$5 each. SASE if you need confirmation. All entrants must pay the registration fee in addition to any table rental fees. Registration for VE exams is at 9 a.m. Walk-ins are welcome. Test sessions are

also held every 3rd Saturday in LaMarque TX, next door to the Fire Station at 1109 Cedar Drive. Registration starts at 8 a.m. in LaMarque. Contact [[tidelandshamfest@aol.com](mailto:tidelandshamfest@aol.com)] or [[aa5op@aol.com](mailto:aa5op@aol.com)].

## JULY 21

**SUGAR GROVE, IL** The Fox River Radio League will hold their Annual Hamfest at Waubensee Community College. Rte. 47 at Waubensee Dr., Sugar Grove IL (5 miles NW of Aurora). Directions: From Chicago take I-88 west past Aurora to "To Route 30, 47-Sugar Grove" exit (Rte. 56). Take 56 to "Galena Blvd. Aurora" exit. Turn right (west) on Galena Blvd. to Rte. 47. Turn right (north) on Rte. 47 and go about 2 miles to Waubensee Community College. Use north (2nd) entrance. Go to Erickson Gym parking. Campus map at [<http://www.wcc.cc.il.us/map/sgmap.html>]. Note: Eastbound I-90, no exit at Rte. 47; Westbound I-88, no exit at Rte. 47. Talk-in W9CEQ rpt. on 147.210(+600) PL 103.5/107.2. Outdoor flea market open from 6 a.m. Free with paid admission. Sales of food and beverages are not permitted. Indoor exhibits open at 8 a.m. Set up Saturday at 7 p.m., Sunday 6 a.m. to 8 a.m. Advance tickets \$4, \$5 at the gate. Make check payable to Fox River Radio League and send with an SASE to Fox River Radio League, P.O. Box 673, Batavia IL 60510-0673. VE exams at 10 a.m. Bring original license, copy of license and photo ID. The appropriate fee is required and exact change would be appreciated. Contact Maurice L. Schietecatte W9CEO, c/o FRRL, P.O. Box 673, Batavia IL 60510. Tel. 815-786-2860, or E-mail to [[w9ceo@arri.net](mailto:w9ceo@arri.net)]. Indoor tables are \$12 per 8 ft. table. Limited number of tables with AC power. Bring extension cord. First come, first served. Overnight camping available at Bliss Woods, Kane County Park, 5 min. from the hamfest. 630-466-4182. No reservations. First come, first served. Sorry, no overnight camping at the hamfest site. The Web site is at [<http://www.frri.org/hamfest.html>].

**WASHINGTON, MO** The 40th Annual Zero Beaters ARC Hamfest will be held July 21st, 6 a.m. to 2 p.m. at Bernie E. Hillerman Park. There will be a ham radio and computer flea market, technical sessions, ham radio demonstrations and more. Free parking. Free admission. Talk-in on 147.24(+) rpt. Watch for



green on white hamfest signs. VE exams registration starts at 9 a.m. Walk-ins welcome (limit 60). Bring original license and a photocopy. For info SASE to **ZBARC VE Exam**, P.O. Box 1305, Washington MO 63090.

#### JULY 27

**CINCINNATI, OH** The OH-KY-IN ARS, Inc. will sponsor their 5th Annual Hamfest at Diamond Oaks Career Development Campus, 6375 Harrison Ave., Cincinnati OH. This facility is located just east of I-275 and I-74. Take I-74 to the Rybolt Rd./Harrison Ave. exit (exit #11). Go east on Harrison Ave. Diamond Oaks is located on the right (south side) of Harrison Ave., less than one mile from the I-74 exit. Special seminars, transmitter hunts, indoor vendors (setup Friday 5 p.m.-7 p.m. and Saturday 6 a.m.-8 a.m.), outdoor flea market (setup 6 a.m. Saturday) — first space free with admission ticket. Additional spaces \$3 each. Indoor vendors bring your own extension cords. Electricity not available outdoors. VE exams at 8 a.m. Walk-ins accepted. Refreshments, free parking, handicapped parking available. Talk-in on 146.670(-) and 146.925(-) rpters. Admission is \$5 in advance, \$6 at the gate, age 12 and under free. Indoor vendor tables (6 ft. with free electric) \$10 each. Contact **Lynn Ernst WD8JAW**, 10650 Aspen Place, Union KY 41091-7665. Phone 859-657-6161; E-mail [wd8jaw@arrl.net]. Web [www.ohkyin.org]. Expected attendance 650-750.

#### AUG 11

**BAYVILLE, NJ** The Jersey Shore ARS will host their Hamfest August 11th at the Bayville Fire House, Route 9, Bayville NJ. Talk-in on 146.910 MHz PL 127.3, and 443.350 MHz PL 141.3. Setup starts at 6 a.m. and the doors open to the general public at 8 a.m. Admission is \$5. Tables reserved in advance are \$15 each, first come basis, includes one admission. Contact **Bob W2CE** at 732-657-9339 or [hamfest@jsars.org]. VE exams registration is at 11:30 a.m.; testing starts at 12 noon.

#### AUG 16, 17, 18

**ESCONDIDO, CA** The ARRL Southwestern Division Convention for this year will be held at the California Center for the Performing Arts. August 16, 17, and 18. Exhibits will be set up in the ballroom. Free parking for both exhibitors

and attendees. Secured hotel rooms at excellent rates at hotels within a three-mile radius of the convention site. Drawings all day Saturday August 17th, each hour 9 a.m. to 5 p.m. To request information, please contact **Nancy Paine KD6WUL**, Exhibits Chairwoman, at 619-466-4216; or **John Hudson III WB6HYQ**, Convention Chairman, at 619-525-4291. E-mail [npaine@earthlink.net].

#### AUG 17

**OAKLAND, NJ** The Ramapo Mountain ARC will hold its 26th Annual Ham Radio and Computer Flea Market on Saturday, August 17th, at the American Legion Hall, 65 Oak St., Oakland NJ 07436. Talk-in on 147.49/146.49 and 146.52 simplex. Vendors' setup starts at 6 a.m. The event is open to buyers 8 a.m. until Noon. The kitchen opens at 7 a.m. Donations \$4. Spouse and kids admitted free. Inside tables \$10 each. Tailgate space \$8 per space. Please contact **Steve Oliphant N2KBD**, 10 Glen Rd., Ringwood NJ 07456-2331. Phone 973-962-4584, fax 973-962-6210, Club E-mail [rmarc@qsl.net]. Visit the Web site at [www.qsl.net/rmarc].

#### AUG 24

**LAPORTE, IN** The LaPorte ARC will hold their LPARC Summer Hamfest August 24th at the LaPorte County Fairgrounds, State Rd. 2 West of LaPorte, 7 a.m. to 1 p.m. Admission \$5, Table \$10, outdoor tailgating \$2. One admission included with table reservation. Talk-in on 146.52 and 146.61(-) PL 131.8. For info contact **Neil Straub WZ9N**, P.O. Box 30, LaPorte IN 46352. Phone 219-324-7525. For table reservations E-mail to [tables@k9jsi.org]. The Club Web site is at [www.k9jsi.org].

#### AUG 25

**DANVILLE, IL** The Vermilion County ARC will hold their 2002 Hamfest August 25th at the Vermilion County ARC clubhouse, Woodbury Hill Rd., Danville IL. For more info contact **Terry Powell KB9REE**, Vice President, V.C.A.R.A., P.O. Box 80, Catlin IL 61817-1007. Phone 217-446-1379, or E-mail [KB9REE@YAHOO.COM].

#### AUG 31

**ALAMOGORDO, NM** The Alamogordo ARC will host their 18th Annual Hamfest August 31st, 7 a.m. to 3 p.m. at the Otero County Fairgrounds in Alamogordo. Admission is free. Talk-in will be on 146.800 with 100 Hz tone. Tables are \$5. Open to all vendors and private sellers or groups. Plenty of tables and space. Limited power is available, let us know. VE exams. Road Runner forum (3939 group) MARS forum (all services). There will be a banquet at 6 p.m. Please pre-register for this. Each 50th ticket eligible for a drawing for a free ticket. Pre-registration contact is

**Ms. June Richmond K5BHE**, 1109 Monroe Ave., Alamogordo NM 88310. Phone 505-437-0298. Other contacts are **Rick Norton KB7SQF**, Club President. E-mail to [rick@nmex.com], or phone 505-443-6190; or **Tom McDaniel KD5FCJ**, Club Secretary. 505-437-1976. RVs can park overnight at the fairgrounds parking lot for free Friday and Saturday. No hookups.

#### OCT 5

**WARSAW, MO** The Twin Lakes ARC will sponsor the Warsaw MO Hamfest Saturday, October 5th from 9 a.m. to 4 p.m., at the Warsaw Community Bldg., one block west of the square. Talk-in on 147.300 on the Warsaw rpters. Setup is at 5:30 a.m. Admission \$2 at the gate. 8 ft. tables \$10 each (hurry, only 30 available). Breakfast and lunch will be served on site. For more info call **Gene** at 660-438-8650, or E-mail to [gpo@advertisenet.com].

#### SPECIAL EVENTS, ETC.

#### JULY 13, 14

**FULTON, NY** The amateurs of the surrounding area, using the callsign NB2M, will operate from 1300Z July 13th through 1800Z July 14th, to commemorate the 100th Anniversary of the linking of the communities of Oswego Falls on the west side of the Oswego River and Fulton on the east side, to become the City of Fulton, New York, on February 2, 1902. Both communities had been in existence for about 100 years prior to that date. Operations will be near the center of the General portions of all bands plus 6 meters through 440 (subject to propagation). A full-size certificate will be available in return for a QSL card and an SASE to **Brien Mathews KA2AON**, 82 Peat Bed Rd., Hannibal NY 13074.

**LAKE CHELAN, WA** Special Event Station W7H will be on the air from the shores of Lake Chelan from 00:00 UTC on July 13th until 23:59 UTC on July 14th. The Lake Chelan Radio Club (K7SMX) is sponsoring this event to commemorate the "World Hang Gliding Championships" being held over 10 days at this location. Listen for W7H on or near the following frequencies: 3.875, 7.250, 14.275, 21.325, and 28.450 MHz. Send an SASE for a special QSL, or \$4 for an 8 1/2 x 11 inch unfolded certificate to **Lake Chelan Radio Club**, P.O. Box 1445, Chelan WA 98816-1445. For more details visit the club Web site at [http://www.lakechelanradioclub.com/].

#### JULY 19, 20

**SANDUSKY, OH** The Sandusky Radio Experimental League, W8LBZ, will celebrate its 70-year anniversary with a 24-hour operating marathon, starting at 8 p.m. EDT July

*Continued on page 57*

#### WANTED

Fun, easy to build projects  
for publication in 73.

For more info, write to:

Joyce Sawtelle,  
73 Amateur Radio Today,  
70 Hancock Road  
Peterborough NH 03458.



## Converting Surplus: A 1296 MHz 1 Watt Amplifier

*This PC board was obtained in surplus material from satellite telephone equipment for a 1661 MHz frequency transmit upconverter. Conversion attempts were made to see if it could be re-used in the amateur band of 23 cm 1296 MHz as nearly as is. My partner in soldering iron crimes, Kerry Banke N6IZW, worked out the details.*

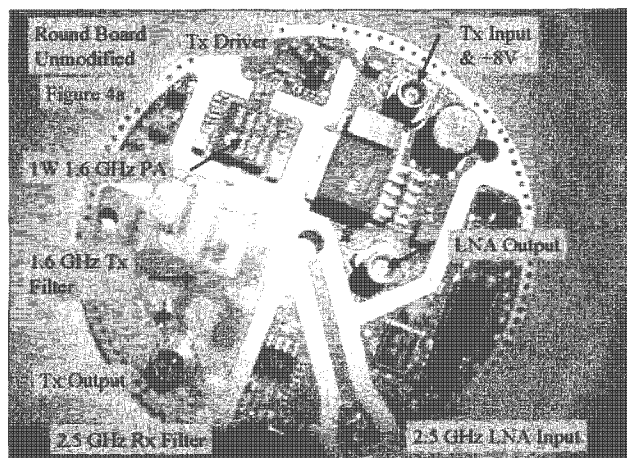
With some easy modifications, “under the magnifying glass” the conversions proved to be quite simple, allowing operation in the 1296 MHz lower frequency amateur band. This was quite fortunate, as the device in question, being a monolithic construction device much like an MMIC amplifier, did not have internal frequency limiting factors preventing use at 1296 MHz. In other words we wanted to remove RF amplifier filters, making direct connections to the device, rather than attempt retuning of the stripline elements. If it had been discrete, then device pruning on the PC board would be a natural course to follow in conversion (i.e., “snowflaking”).

In **Photo A**, the 1-watt device is labeled

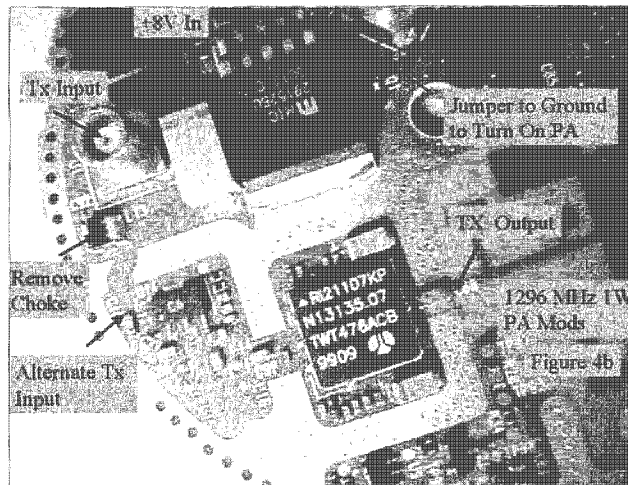
TWT476ACB and is driven by a transistor labeled C6. Miniature coax connectors connect the input and output of the power amplifier circuit. DC power, RF input drive, and RF output flow through these connectors in the unmodified state. The connectors can be removed in the conversion. With the exception of the power supply circuits the major components of the power amplifier circuits reside on the left side of **Photo A**. The 1.6 GHz filter that resides on the lower left side of **Photo A** will be disconnected in the conversion.

The modification of the amplifier can be started by turning on the control line enabling the amplifier in the transmit mode. This is done by grounding transistor Q1's

trace nearest to the coax connector in the center of the board. Either run the wire lead to PC board ground or tie to the nearby coax connector body for a close good ground. Length is not critical. This transistor resides between the power regulator pin where we input +8 VDC and the coax connector near the middle of the PC board. Because this connection is quite tiny, a small strand of wire is best used to make this connection. See **Fig. 1** for details on DC power input changes and transmit keying lead identification. I stripped a short section of AC lamp zip cord and extracted one strand of gauge #30 or so. Fine wire to be sure. I tack soldered to the transistor top right pin nearest the center coax connector and ran the wire



**Photo A.** Shown here is a full board picture of a surplus satellite telephone receive transmit amplifier control PC board. Normal frequency of operation is 1661 MHz, and this is convertible to 1 watt amp at 1296 MHz. (Photo by N6IZW)



**Photo B.** Close-up of amplifier showing connections made to PC board for amateur use of the 1 watt amplifier chip. (Photo by N6IZW)



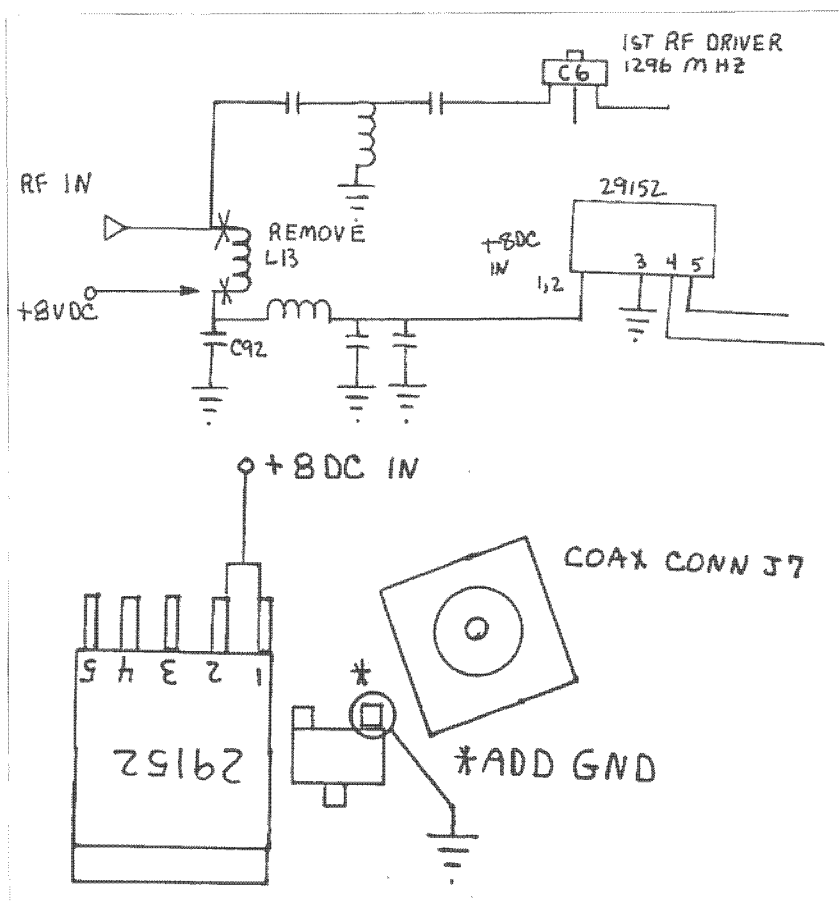


Fig. 1. The modification connections for DC power input and transmitter turn on RF input and output connections.

to the closest ground connection, the coax connector shell.

Next, remove inductor L13 positioned next to RF input coax connector J1. Cut the

coax connector trace that was connected to one side of L13 and attach a small diameter coax cable (center conductor) to C107, which was part of one trace connecting L13 (now removed), and ground the coax braid. Scrape the green masking and cut to suit on the trace connecting to C107 for center of coax termination point. DC power attaches to pin #1 of the regulator 29152BU (bottom left is pin #1 with chip writing right-side-up). This will be the +8 volt DC input for transmit amplifier. If you want DC filtering on the +8 volt input DC lead, tie to the other side of L13 the inductor removed as above.

If you follow that, in original condition coax connector J1 adjacent to inductor L13, provided both input DC voltage of +8 volts and RF input drive for the amplifier chip. Removing L13 and tying the input RF to the coax center conductor on the PC board trace previously occupied by the inside of L13 provides RF to the amp. The other side of the L13 connection on the PC board is tied through the inductor marked 100k and on to pin #1 of the power supplies device.

Output RF power connections are made to capacitor C88. But first cut the filter trace about 1/8th of an inch beyond C88 on the output of the power amp chip. Again, scrape off the green masking to allow soldering the coax center conductor to the capacitor and trace extension. By cutting the filter 1/8 of an inch beyond C88 towards the filter, this effectively disconnects the filter from the circuit. Remove sufficient filter input trace to remove filter from the circuit.

### Testing the power amp

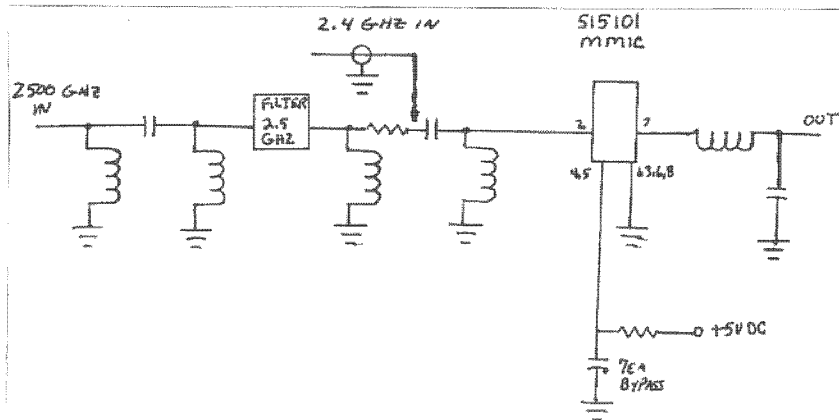
Check out of the amplifier is quite simple. Just adjust the drive level at 1296 MHz and DC power input limited to +8 volts DC and check power on a suitable power meter. In my setup, I used a Bird thru-line wattmeter with appropriate slugs for 1296 MHz frequency. I like the Bird wattmeter for amplifier experiments because it can survive a large, unexpected power surge to the meter and still function. Say, for example, the amplifier goes into oscillation and the power output soars beyond what is expected. When things calm down and prove what is expected, another meter may be better suited for precision readings. For precision readings in the tenths of a dB, a Hewlett Packard 432 wattmeter with a 478A thermistor power head and 30 dB attenuator are quite exact as to power readings.

Using the Bird model 43 wattmeter with a 5k slug (5 watts 1.1 to 1.8 GHz) and applying 1296 MHz at zero dB, the amplifier produced a quarter of a watt. Increasing the



Photo C. The test and evaluation setup. Nothing complex, just the drive source for low power tests with the Wavetek 2001A sweeper set at 1296 MHz; zero dB RF drive for first cut test. Detector is the Bird model 43 power meter. Line terminated into a 50 ohm DC to a 12 GHz 40 watt coaxial termination.





**Fig. 2.** Describes an additional onboard 2.500 GHz low noise receive preamp chip that is easy to convert to a 2.400 GHz low noise preamp for use with AO-40.

drive to the signal generator's maximum power output of +4 dB made the amplifier produce one half watt. Current was just over 600 mA as read on the power supply amp meter. Switching to my RF sweeper, a Hewlett Packard 8620 which can produce +17 dB output, I inserted a fixed 10 dB attenuator in series with an adjustable 0–10 dB attenuator for final power adjustment evaluation. See **Photo C** for setup of equipment used to test the amplifier. The long square device in foreground is a variable 0 to 10 dB microwave attenuator for power drive tests.

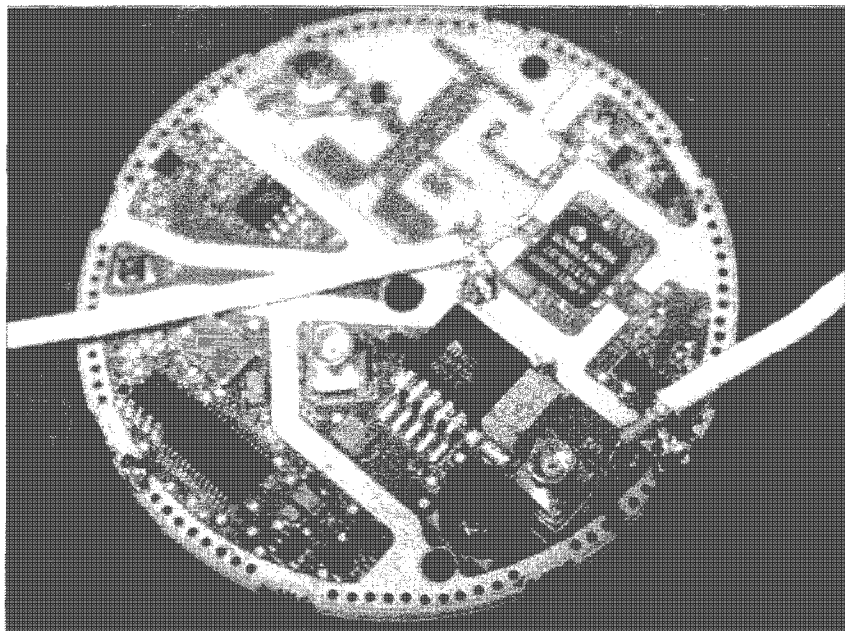
DC power reapplied and RF drive slowly increased from 0 dB to just a few tenths over plus 5 dB drive, the amplifier power was

indicating a full 1 watt saturation output. Total device current draw at +8 volts DC was 1 amp. I left the power supply in a full keydown condition for just over 1 minute and then shut down the system. Feeling the amplifier chip, it was noticeably hot, but not over so. For SSB operation the duty cycle will be much lower than this full keydown test of CW operation and I do not believe a heat sink will be needed for SSB operation. Add a package to shield the amplifier and connect the coax connectors used in this project, and that pretty much finishes the conversion of the amplifier portion of the PC board.

There resides on this same PC board an RF amplifier, an LNA for 2500 MHz. It's

shown in the photo for the full round PC board. It's the little pie-shaped outline circuitry. The little square chrome part is a 2500 MHz filter that needs to be bypassed for operation at 2400 MHz. RF input is pin #2 of the LNA chip. It is fed by a series chip capacitor that ties to pin #2 with coax for RF input. Preamp output is tied to capacitor C85 with the preamp coax connector. I use a short section of miniature copper hard line .040 scrap that has an SMA connector attached to it for connection. Other suitable miniature coax sections will work here also. Just make sure it's a microwave miniature coax cable. Don't even think of trying a coax not microwave-rated like RG-58 or something like that — too much loss even at 2400 MHz and too large in dimensions.

Well that's it for this month. I hope this easy-to-modify 1296 amplifier chip conversion does the trick for those of you contemplating construction of 1296 MHz equipment in the home shack. Junk box construction is quite a bit of fun and is enjoyable provided you can locate some key component to use in your project. Let's get stimulated and do some homebrewing for one of our Above and Beyond microwave frequencies. As with all the material I present, I will make the amplifier board available for \$18 postpaid U.S. destinations. For this and any other suggestions or questions please drop me an E-mail at [clhough@pacbell.net]. I will be glad to answer questions regarding this project or other amateur-radio-related items. 73



**Photo D.** Full board modification coax in/out and DC input leads. Board wired for full turn on when +8 VDC applied. Keying transistor wired to ground to turn amp on. Switching for receive and transmit external relay controlled.

**Say You Saw it In 73!**

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## Simple File Handling with a Free Log Program

*Prior to the digital revolution, I was using the paper-and-pencil method of tracking QSO activity. The marvel of the computerized log seemed very remote. It would have been difficult to pry the cost of a dedicated program out of my tight little fist in those days just to do something I thought I could do as well by hand.*

Then along came a revelation: After using the early PSK31 software, there suddenly appeared a new freeware program called Logger that had a purported marvelously easy method of tuning the PSK31 signal. Simply click on some little bump on the screen and you would start to see print on the monitor.

As the name of the program implies, the main function of the software was logging. What a novel discovery. After playing with the PSK module, I started experimenting with the log portion of the software. There was a learning curve, but it was an attainable skill. This was the beginning of my ability to spot calls that I had worked previously, and much more quickly than with the paper log.

There are a number of logging programs available, mostly at a price. They are all good. Some are specialized and directed toward certain users such as contesters. Most log programs are exceptionally effective in chasing some or all of the many

awards available for working states, countries and counties, etc.

Logger does a multitude of these jobs adequately for what we may call Average Joe Ham. I assume that is my classification, being neither an avid contest nut, nor a real DX hound. My participation in these areas is limited partly by time and mostly by lack of skill and persistence, so I really like to ragchew, and therefore my logging needs are answered well by such software.

Don't get me wrong. I play briefly at contests and do take the challenge to see if I can be heard by the rare DX station, but, though a real thrill, I do not persist. I think I am accidentally going to qualify for a few awards one day just by sheer numbers of contacts. But I will never in this lifetime qualify for any of the biggies like DXCC.

As contesting goes, recently I became aware that a contest was in progress. After I spent the better part of an hour to get set up, I entered the fray and was forced to stop after an hour or so, and then resume the next

day for about a half hour, and that was it. I logged about eleven QSOs and it was fun. Time is a definite limiter for me. And, by the way, there are programs geared specifically for contesting, which is another topic beyond the scope of this article.

is because it is so easy. Fill in a few blanks during a QSO and hit the Magic Key at the end, and it is recorded.

When I recently got the Win98 setup running, and had the immediate stable of necessary programs installed, one of the next priority programs to install was the latest version of Logger. I already had a program in place which contains an integral log program. MixW 2. And that log was finally up-to-date after some transfer hassles I will explain in due time.

Next question: Why did I want a second log program? Well, that is just after-the-fact reasoning on my personal agenda. The last time I experienced a problem with a lost log, I happened to recall there was an earlier log file sitting in an old computer in ADIF format as it had been exported from Logger. It was in a virtually useless file system, much of which was in a corrupted state, and only accessible by copying it to a floppy using DOS commands.

But I got it and was glad it was available. That file imported very nicely into the MixW program and from there I was able to pick up the pieces and restore the log to as near 100% as I can tell of its prior state.

### Import/export

That is where I want to impart a few thoughts for the day. I talk to a lot of hams who have these remarkable computerized logs and the words "export" and "import" are just about as scary as a dark figure lurking in an alley.

Now, I have to admit, there are a lot of different types of log files and a lot of programs that treat these files differently. The process of converting, importing, and exporting between programs seems intimidating at first. The secret comes together

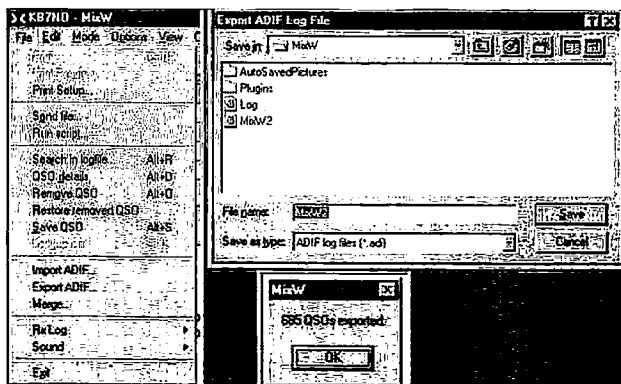


Fig. 1. MixW log export — This is a composite shot of the three windows you will encounter when you export your log from this program as outlined in the article. The exported ADIF log is the one labeled "MixW." This part is guaranteed painless.



quite easily when you have programs that virtually do the job for you.

Without dwelling on instances when I have experienced failure in file imports, I will tell you about two programs (minimum) that will swap log files almost (got to have a small qualifier) flawlessly. That is, Logger and MixW. I will get to several others, but I want to concentrate on two in this computer that really work and I can explain how easily you can do this.

I have found Logger to be very cooperative with a number of pieces of software when importing logs. Any program that will export in ADIF format can transfer logs to Logger. Though it is not necessary to know, you should be aware that ADIF is an acronym for Amateur Data Interchange Format, which is an accepted standard for log programs.

One other note: Logger, when running in the background with IZ8BLY programs for MFSK and other modes, will automatically record the QSO info when you click the Log button in those programs. This means you can get all your contacts recorded in one place even if you use a number of programs for your digital chores. Of course, you can manually enter SSB QSOs in real time just as well.

## Demo time

Let's start by converting and exporting a log file from MixW. Referring to the composite shot of MixW screens, you start by clicking on the File menu. Then click on Export ADIF, and you will have a Window pop up, for which you should record the address. Most likely, yours will work just as shown in the illustration and the ADIF file you save will simply be in the MixW directory or "folder" as they say in Window-ese. If it goes somewhere else or if you have Logger on another drive, you will want to know where to hunt later. So just be forewarned.

Clicking on the Save button on that pop-up window will initiate a process that goes surprisingly quickly. When the file has been compiled, usually in less than a minute, a small window will display the message that a certain number of QSOs have been exported. That's all there is to it.

In my case, I have both MixW and Logger configured to use the same serial port. Just to relieve tension between the two programs, I shut down MixW and bring up Logger, although I find the Logger program will run after clicking on a pop-up box that announces the port is not available. I mention this because the conflict may be genuine on your computer, so do

not be surprised if it is necessary to only have one program running at a time.

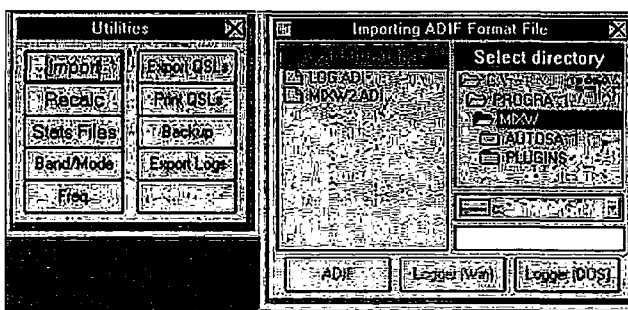
With Logger up, click the Utilities box and a box will pop up as illustrated in the Logger screenshot. Here, more than one "click" is necessary to complete the process of importing. In other words, new windows do not materialize each time you perform an action.

When you click Import, a Window does pop up that is labeled "File Import Utility." Then you click ADIF and the name at the top of the little window changes to "Importing ADIF Format File."

Then, you have to direct the program to where you saved the previously exported ADIF file. Usually, all there is to this is addressing the "tree" display and clicking as necessary to get to the location of the file you wish to import. In the case of MixW and many of the programs we use, the program will be located in the "Program File" directory. Once you have manipulated the tree around to the program file directory, select that and the programs will be displayed, and you can select your program where the file was saved.

Once you are this far, you are practically home-free because Logger homes in on any file in the selected program's directory that it can identify as an ADIF file. Now all that remains is to choose the file you saved and double-click on it. Another little window pops up giving you a choice that is self-explanatory and once past that window the file is automatically imported.

Following the import, a window pops up with way more information than I want to display in a screenshot. However, this window helps you make a complete success of your file transfer. You are informed about the number of successful records imported and that a file has been created holding the



**Fig. 2. Logger import** — These are the windows referred to in the article concerning importing an ADIF log into Logger. The "tree" referred to in the article is shown to the right. This may be the only place, if you are unfamiliar with file structure, that will offer resistance. In this case, the highlighted MixW directory or folder is where Logger will seek an ADIF file and post any of these files it finds to the immediate left window. See article for procedure.

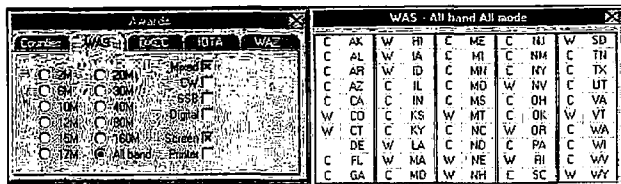
unsuccessful imports. If you will pay attention to the instructions concerning this file you will be able to correct errors as they are outlined in plain language in the "bad" ADIF file.

Note the "plain language" reference. When I made an import of over 600 records, the program created an external within the Logger directory with about 20 unacceptable records and for each one of them there was a line of text spelling out what needed to be fixed so they could be imported from this file. Double clicking on this "bad" file brought it up in the standard editor, Notepad. I won't go into the details, but the program practically takes you by the hand to get over these little hurdles.

Both of the programs I mention here have statistical summaries available to give you an overview of where you stand in your hunt for awards. They vary quite a bit in their format and detail. I included screenshots of a partial view of these summaries from each. When you see how valuable these statistics can be for award hunting, you may suddenly

**Fig. 3. MixW status window** — The log can be scrolled through, edited, searched, or, as in this case, a statistical summary can be called up. Logging is not the primary purpose of this program but is adequate for many of us.





**Fig. 4.** Just one of the Logger awards tracking displays. You can see some of the depth available in this program for specific tracking of your progress.

decide tracking for awards is something you are interested in.

I find there are commercial programs that go into quite a bit more detail for record keeping and summarizing. When you get serious about tracking your progress and feel you can justify the expense, there is quite a choice of log programs available. Each has its own following and the devoted users swear the one they use is the best.

There are probably no bad log programs out there once a user becomes used to the one he has. If you decide to go that route one day, you will likely have had the opportunity to talk to a number of users and looked over the specifics to such an extent that you can make an educated decision.

commercial software. For many, this package is more than adequate, so give it a try, or if you have tried it and thought it strange or complex, take another look. You may be surprised once you get into using it. It sure beats the paper log.

### Something I overlooked

Recently, I received a message about some ideas that I have not explored in the digital ham's software arsenal. There is more soundcard software available and in use than what I have told you about. The folks who are working with EME and high-speed CW are enjoying some remarkable success. There is a Web site for those who

In the meantime, Logger is available and it works. And it is free for the download. Free is quite a selling point for many of us. You can get your records organized and perhaps you will never find the need to upgrade to

fantasy tale, the mad scientist managed, with what seemed his last gasp of living breath to grab the jar of magic elixir and right the damage. In the process the scientist was also saved and lived to perform many more daring and wonderful experiments.

That is somewhat how it worked. The computer had failed to a point where it would not boot and seemed to suffer an especial aversion to being connected to its monitor. I hate to put this in print, but some part of this was no more explainable than the laboratory spoof alluded to above.

Here is how it was resolved. It appeared, owing to the displayed symptoms, that significant damage had been suffered by the hardware innards of this machine. One of the items I was qualified to test, the power supply.

So when I was in a calmer state and the time was appropriate, I removed the lid and scanned the inner workings, stuck my fingers on a few boards and connectors to see if anything was simply mechanically askew. Nothing evident, so on with the test. There are plenty of leads from the power supply to power about anything I might fit in the case and the supply is marked as to what voltages to expect where. All checked as specified.

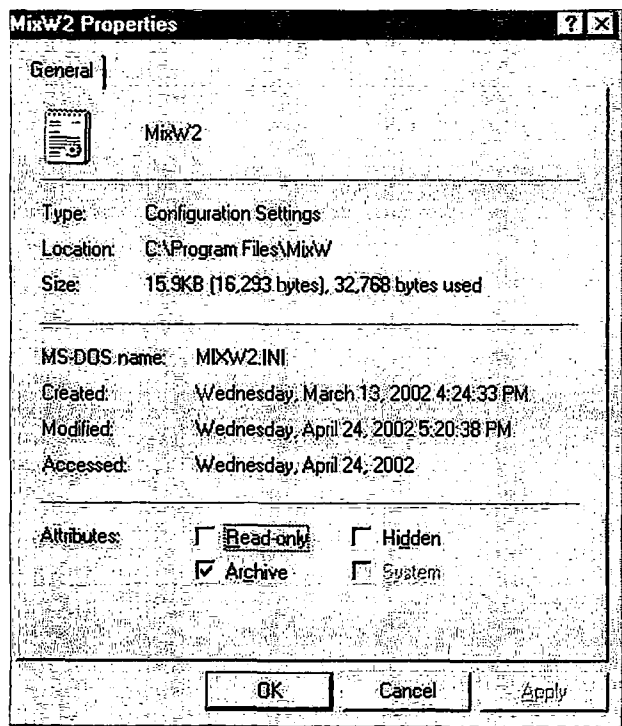
I was reasonably certain that up to this point I had not yet cured this ailing machine. Next step was to shut it down and retrieve an older monitor for which there apparently was not a proper driver on the hard drive. With this installed, the machine began to gasp a bit and then regain consciousness. I doubt if I will ever understand what I saw.

On the monitor was a message that no keyboard (or was it mouse?) was detected. Next step, power down and install mouse and keyboard. The monitor then began to display some strange multiples of a desktop. The strange display was a welcome sight and I chalked the peculiarities up to the wrong driver sending unfamiliar information to the monitor. But it had booted!

Trying to contain my enthusiasm, I carried the various pieces back into the shack and disconnected the interim setup from the monitor that belonged to the afflicted computer and "Presto!" The machine fired up as if there had never been a bad day. The programs that were installed before the failure were all working just as they had at that time.

### Some actual learning takes place

Though I felt a little like a doofus concerning the "hardware" failure, I put that behind me and decided I could live with that



**Fig. 5.** Windows properties — This was one of my major lessons learned the hard way (see text) after changing the operating system. Text and program data files were coming off the CD I had stored them on with the Read Only box checked. Refer to the text concerning the problems this caused. I would have been smart to have simply saved many of these small files to floppy. But I would have missed out on education!

would like to take a look-see at: (<http://ham.te.hik.se/homepage/sm5bsz/index.html>). There is more going on than we can keep up with.

### All about taking one giant step backward

You have probably wondered where the installation of the antiquated Windows 98 into the "modern" computer that had come equipped from the factory with the Millennium Edition (Me) of Windows was leading. When we last visited the deep recesses of the laboratory, Igor had just struck a mighty blow to the hardware and all was lost.

However, after the fashion of the really well written



if this machine could continue to cooperate in the manner I desired. I didn't keep a log of this activity, but I did put a note in the station log concerning a first QSO after a restored file and that was three weeks ago. So it is looking like the Most Revered Computer God is smiling on me.

Now there was at least one area I can tell you about where I learned something worth mentioning. I believe I alluded to the fact I had not been able to install the log from the CD where I had saved it before formatting the hard drive. I think I have learned the reason for that, a little late to save bunches of excess entries, but perhaps of value to some of you.

At the time I was planning to save the more highly valued contents on the hard drive, I put anything I thought I might need on a CD and followed the various instructions. All went fairly well as far as downloaded ham program files went. They simply have, thus far, installed in their normal manner.

But I could not get some of the stored word processor files such as what I am writing today to respond correctly when I went to open them. They would open with a message that they could not be rewritten and then saved in their original file, even after the file was residing on the hard drive. Plus, there was this problem with the individual files in the ham programs such as the log files and the macros.

After a lot of calisthenics including manual entry of a few hundred contacts, I started to rewrite the macros that were apparently corrupted. To make me a little more uneasy, I had trouble getting the macros to "stick." That is, I would rewrite them and do something else in the program and the macros would default back to some unexplainable state unlike what I had just written.

After a bit more experimenting, I found I could rewrite a macro file only after I deleted the offending file from the macro file and replaced it with all new under a new (but the same as it had been before) name.

You would think I would have awakened before this, and I am sure a few of you know what was going on. Something clued me to take a look at the attributes of some of these uncooperating files. In Windows, it is pretty easy to locate the file for which you seek info and right click it, and then choose "Properties." (See screenshot.)

The particular Properties screenshot I made for this article is one of those critical areas in most programs, the \*.ini file. My MixW 2 program had a few things it was not doing properly until I allowed the

program "to talk to" the INI file by unchecking the Read-only box. After doing so, things got back to normal. That is, among other items, the screen display would return to where it was on shut down and the "hint of the day" would update automatically.

These files, word processor documents as well as program files such as log files and macro files, were all marked "read only." These files need to look to the program like a file that can be written to as well as read.

I have a fairly simple mind, but this was just too simple for me to have realized in the beginning. All that is really necessary in this case is to locate the files in question and uncheck the Read Only boxes and they

start to work normally. The lesson? Saving to a CD is a bit different from saving to a floppy disk. I am not sure what needs to be changed in the process, but unchecking the offending box is one after-the-fact fix you may want to keep in the back of your mind for reference one day.

### Programs start to act normal again

As I have stated previously the reason for the change "backward" to the Win98 is there are beginning to be a number of ham programs that will not run properly on the

*Continued on page 58*

Source for:	Web address (URL)
MixW2 Soundcard pgm for PSK31, RTTY - more + New modes - MTTY - FSK31	<a href="http://lav.kiev.ua/~nick/mixw2/">http://lav.kiev.ua/~nick/mixw2/</a> <a href="http://www.nvbb.net/~jaffejim/mixwpage.htm">www.nvbb.net/~jaffejim/mixwpage.htm</a>
Free MMHam site - MMTTY - MMSSTV	<a href="http://www.qsl.net/mmhamsoft/">http://www.qsl.net/mmhamsoft/</a>
Free VK7AAB - SSTV-PAL - PSK-PAL	<a href="http://users.origin.net.au/~crac/">http://users.origin.net.au/~crac/</a>
Much ham info w/SSTV downloads	<a href="http://www.conknet.com/~kb1hj/index.htm">www.conknet.com/~kb1hj/index.htm</a>
TrueTTY - Soundcard RTTY w/PSK31	<a href="http://www.dxsoft.com/mitrtty.htm">www.dxsoft.com/mitrtty.htm</a>
Pasokon SSTV programs & hardware	<a href="http://www.ultranet.com/~sstv/lite.html">www.ultranet.com/~sstv/lite.html</a>
PSK31 - Free - PSK31 & much PSK info	<a href="http://aintel.bi.edu/es/psk31.html">http://aintel.bi.edu/es/psk31.html</a>
Interface for digital - rigs to computers	<a href="http://www.westmountainradio.com/">www.westmountainradio.com/</a>
Soundcard interface info-includes Alinco	<a href="http://www.packetradio.com/psk31.htm">www.packetradio.com/psk31.htm</a>
Interface info for DIY digital hams	<a href="http://www.qsl.net/wm2u/interface.html">http://www.qsl.net/wm2u/interface.html</a>
WinWarbler info and DXLab Suite	<a href="http://www.qsl.net/winwarbler/">www.qsl.net/winwarbler/</a>
MFSK - related tech info - how it works	<a href="http://www.qsl.net/z11bpu/">www.qsl.net/z11bpu/</a>
Throb - - Lots of info	<a href="http://www.lsear.freemove.co.uk/">www.lsear.freemove.co.uk/</a>
Download Logger / Zakanaka	<a href="http://www.qsl.net/kc4elo/">http://www.qsl.net/kc4elo/</a>
PSKGNR - - Frontend for PSK31	<a href="http://www.al-williams.com/wd5gnr/pskgnr.htm">www.al-williams.com/wd5gnr/pskgnr.htm</a>
DigiPan - PSK31 Easy to use	<a href="http://www.digipan.net/">http://www.digipan.net/</a>
TAPR - Lots of info	<a href="http://www.tapr.org">www.tapr.org</a>
TNC to radio wiring help	<a href="http://freeweb.pdq.net/medcalf/ztx/">http://freeweb.pdq.net/medcalf/ztx/</a>
ChromaPIX & ChromaSound DSP software	<a href="http://www.siliconpixels.com">www.siliconpixels.com</a>
Creative Services S/W Multi-mode w/PSK	<a href="http://www.cssincorp.com/products.htm">www.cssincorp.com/products.htm</a>
Timewave DSP & AEA (prev.) products	<a href="http://www.timewave.com">www.timewave.com</a>
Auto tuner and other kits	<a href="http://www.ldgelectronics.com">www.ldgelectronics.com</a>
RCKRty Windows pgm w/free DL	<a href="http://www.rckrty.de/">www.rckrty.de/</a>
SV2AGW free Win95 programs	<a href="http://www.raag.org/index1.htm">www.raag.org/index1.htm</a>
Source for BayPac BP-2M & APRS	<a href="http://www.tigertronics.com/">www.tigertronics.com/</a>
Int'l Visual Comm. Assn. dedicated to SSTV	<a href="http://www.mindspring.com/~sstv/">www.mindspring.com/~sstv/</a>
Hellschreiber & MT63 & MFSK16 (Stream)	<a href="http://iz8bly.sysonline.it">http://iz8bly.sysonline.it</a>
HamScope - multi-mode w/MFSK16	<a href="http://users.mesatop.com/~ghansen/">http://users.mesatop.com/~ghansen/</a>
YPLog shareware log - rig control - free demo	<a href="http://www.nucleus.com/~field/">www.nucleus.com/~field/</a>
WinLink 2000 system info	<a href="http://www.winlink.org/k4cjp/">www.winlink.org/k4cjp/</a>
Another GREAT Web resource	<a href="http://www.g3vfp.com/">www.g3vfp.com/</a>
Airmail - free program to use WinLink2000	<a href="http://www.airmail2000.com/">www.airmail2000.com/</a>
WinPSKse - PSK31 freeware	<a href="http://www.winpskse.com/">www.winpskse.com/</a>
The Chart NOW ON THE WEB	<a href="http://www.qsl.net/wa2hng/ham_radio.htm">http://www.qsl.net/wa2hng/ham_radio.htm</a>

### The Infamous Chart - Almost everything ... updated monthly

Table 1. The Infamous Chart.



### Writers' Camp

*What is involved in writing a column for 73 Amateur Radio Today? How does a particular event or gadget get chosen to be a topic? What happens between getting the idea and seeing the final column in print?*

Actually, writing a column or an article isn't all that hard if it's about something that interests you. Many people who are reading this could write an article for 73 and see it published with very little difficulty. I'll tell you how I see it and maybe some of you might find it appealing enough to try your hand at writing an article for Uncle Wayne.

1. Find something interesting that you'd like to share with others. I enjoy amateur radio, and especially enjoy the ability to help others through public service communications. I have a great time with those little gadgets or gizmos that make it possible to carry out communications. Since I enjoy these things so much I naturally enjoy sharing this with others. Give me an audience and I'll talk about it. If I don't have an audience, then I'll put it down on paper. In a manner of speaking it's harder to not share something that interests us and easier to share it. Where do I get my ideas? Sometimes it's because I've seen something new — either a product or a procedure. Maybe there was a different approach to handling something that we all do routinely such as using a computer to design your own QSL cards. In other cases it may be a question or an idea that a reader has sent me. In other cases I've tried to look at an aspect of the hobby through the eyes of someone who is just getting started. Why did this hobby fascinate me so much that I got involved? What things would people today find just as interesting? Each of these things is the starting point for a column or article.

2. Think about what you want to say. In my case, I usually focus on how something works or what it does as opposed to the in-depth technical aspects of the subject. When I've written about APRS I tended to focus on what the benefits are as opposed to how the individual packets are constructed

to carry the data. Amateur radio is a technical hobby, but it is a hobby so I find it more interesting to focus on the benefits. In other words, ask yourself why you find something interesting and how you can share that in terms someone else might enjoy. It's best to write what the reader wants to read rather than what the writer wants to write. That may sound confusing, but here are two ways of writing about the same topic:

a. Filet mignon is one of the choicest servings of beef. It is relatively lean yet full flavored with a delightful firm but juicy texture. There is no doubt as to why this is the premium choice of gourmets.

b. The psoas muscle is cut from the posterior bovine carcass and cut into 8- to 12-ounce segments. After a period of exposure to microbial agents, the tissue is considered "aged" and heat-treated before being consumed as an energy source for *homo sapiens*.

Same subject, totally different approach.

If you want to be a writer, you need to write. There is nothing quite as daunting as a stack of plain white paper to a writer. It stares at you and you stare back (okay, it's actually a virtual piece of paper on the word processor, but you get the idea). Sometimes the best way to get started is just to write — about anything or nothing. This can then lead to the core of the article you will eventually write. Another approach is to write the article mentally and then translate it to paper. I find that sometimes when I'm jogging my mind will begin to wander, then focus on an idea. By the time I get home I've got a pretty good skeleton of the article I will write. If you're more of a linear thinker you may want to take this a step farther and write an outline of what you want to cover. In any case, start getting the idea down onto paper. Once that page is no longer blank it is easier to make real progress. In most cases you'll build from what you started, although

every writer has started an article that started in one direction but ended up being totally different.

Writing is kind of like living in a time warp. This column is being written in April for publication in the July issue. You are therefore reading something that is months old and a lot may happen between when it is written and when it is read. I've written articles based on products that have been discontinued by the time the article was printed. Most of the time this is not a major problem, but there are implications. What I wrote in the summer of 2001 was eclipsed by the terrorist attacks of September 11th. On a smaller scale, writing a Christmas issue column in September seems a little odd. If you're interested in writing an article about Field Day, plan accordingly.

There may be awards for writing, but I don't expect to see one. I believe it was Stephen King who pointed out that the check is cashed and the money spent long before the awards are given out. Personally, I write because I enjoy doing so. I hope others enjoy what I write as well. On the other hand, if everyone agrees with everything I write it would be pretty boring. Wayne Green's editorials always generate discussion, controversy, etc. Yet for decades people have been drawn to his articles like moths to a bright light. You may find that others disagree with what you've written, but that doesn't so much mean you're wrong (although that's certainly possible) as much as that you've generated thought. In this politically correct time when feelings are the focus, it's good to do something that gets people thinking.

Even Pulitzer Prize winners have editors. One of the beauties of writing is that with rare exception the writer is not alone in

*Continued on page 59*



# New Signals

*For the amateur-radio satellite enthusiast, 2002 has had a great start. We've had reliable operation via AMSAT OSCAR-40 (AO-40); fun with the FM satellites like UoSAT OSCAR-14 (UO-14) and AMRAD OSCAR-27 (AO-27); and great digital experimentation and communication via Nav OSCAR-44 (NO-44), the International Space Station, and UoSAT OSCAR-22 (UO-22).*

The list goes on, with the Fuji satellites, the RS series, and others. Keeping up with them is challenging, and there always seem to be new ones.

## A Saudi surprise

In early April, AMSAT president Robin Haighton VE3FRH received a message from Turki Al-Saud at the Space Research Institute in Riyadh, Saudi Arabia, announcing the long-awaited activation of the amateur-radio system on Saudisat OSCAR-41 (SO-41). Turki Al-Saud was the author and presenter of a paper at the Saudi-Japanese Symposium on Remote Sensing Applications in 1997, entitled "A Development of Saudi Educational Micro Satellites." The Saudisat group had been studying and

developing plans for their successful launch of two small satellites in 2000 for several years.

On September 26, 2000, a Russian Dnepr-1 (modified SS-18 ICBM) rocket was launched from the Baikonur Cosmodrome near Tyuratam in Kazakhstan. The payloads included MegSat-1, Unisat-1, Tiungsat-1 (now known as Malaysia OSCAR-46 or MO-46), Saudisat-1A (SO-41), and Saudisat-1B (SO-42). The final orbit for the satellites was at 650 km altitude with an inclination to the equator of 64.5 degrees. Like the Russian RS series of hamsats, this is not a polar, sun-synchronous orbit, and thus the satellites do not come by at the same time every day, but exhibit "drift." Orbits in one month may occur just after midnight and noon, but in a subsequent month may be in the late mornings and late evenings. It's constantly changing.

The Saudisat pair are the first experimental/amateur satellites from Saudi Arabia and their national scientific organization. In 1977 the Saudi Arabian government established the Saudi Arabian National Center for Science and Technology (SANCST). The name was changed in 1985 to the King Abdulaziz City for Science and Technology (KACST), but not before they created a department called the Space Research Institute, or SRI, in 1983. The SRI goal is to develop aerospace technology in support of the kingdom's technology transfer programs. The Saudisats are not just ham-radio toys in space. Their primary payloads were designed to support SRI objectives.

Each of the Saudisats weigh 10 kg, are 23 cm on a side, and have solar cells on all sides, providing a peak power of 18 watts. Each has six gold antennas on the top and bottom panel areas. The onboard experiments include attitude control with passive

magnets, solar panel shadowing, satellite ranging, a digital electronics radiation detection device, thermal control, a single event upset counter, a self-healing battery charger, a mechanical RF relay, two circular-polarization UHF antennas, and multiple analog and digital communications systems. These are some loaded microsats.

A ground control station in Riyadh monitors nearly 60 channels of telemetry and provides command and control operations for both Saudisats. The satellites have survived almost two years in space and are doing well with their experiments, and now, Saudisat 1A is active with single-channel, cross-band, FM repeater activity.

## SO-41 ham operation

The uplink for SO-41 is 145.850 MHz with a downlink of 436.775 MHz. As with the other FM hamsats, there is considerable Doppler shift on the downlink during overhead passes (as much as 20 kHz). At the beginning of an overhead pass, the downlink can be as high as 436.785 MHz. Just before LOS (loss of signal) at the end of a pass, the center of the FM downlink will be best heard around 436.765 MHz. Power output is one watt.

Unlike satellites like UO-14 and AO-27, it is somewhat difficult to work SO-41 with a handie-talkie and a handheld antenna like the Arrow. Satisfying contacts are best from well-equipped home stations with circular antennas and the ability to shift polarization. While most hams have set their crossed-Yagi antennas for only RHCP (right-hand circular polarization), optimum reception and transmission is obtained by switching from one polarization to the other when uplink or downlink fades occur. The

N5VFF-1>DM79, NOCALL* <UI>:N9AB - hi andy, here brian
WD4OZN>EM55, NOCALL* <UI R>:whats ur qth andy
W5ACM-2>EL29EQ, NOCALL* <UI R>:hi brian!
K5PK>EM96TD, NOCALL* <UI>:
N9AB>CQ, NOCALL* <UI>:qTH EN52xg
KD4RDB>APRS, NOCALL* <UI>:
W5ACM-2>EL29EQ, NOCALL* <UI R>:
K5PK>EM96TD, NOCALL* <UI>:
W5ACM-2>EL29EQ, NOCALL* <UI R>:hi k5pk
K5PK>EM96TD, NOCALL* <UI>:Hello ACM
N5UXQ>CQ, NOCALL* <UI R>:de N5UXQ, FM17ho, from Central VA
W5ACM-2>EL29EQ, NOCALL* <UI R>:Andy hr
K5PK>EM96TD, NOCALL* <UI>:Steve hr
W5ACM-2>EL29EQ, NOCALL* <UI R>:fb

Table 1. Kolibri (RS-21) telemetry equations.



## Peak Performances at Pine Mountain

*Who says all hams are couch potatoes? Some are quite athletic! They have found a way to combine their fondness for the outdoors with their love of radio. No, I'm not referring to Field Day. I'm talking about the sport of international-style on-foot hidden transmitter hunting, also called radio-orienteering and ARDF.*

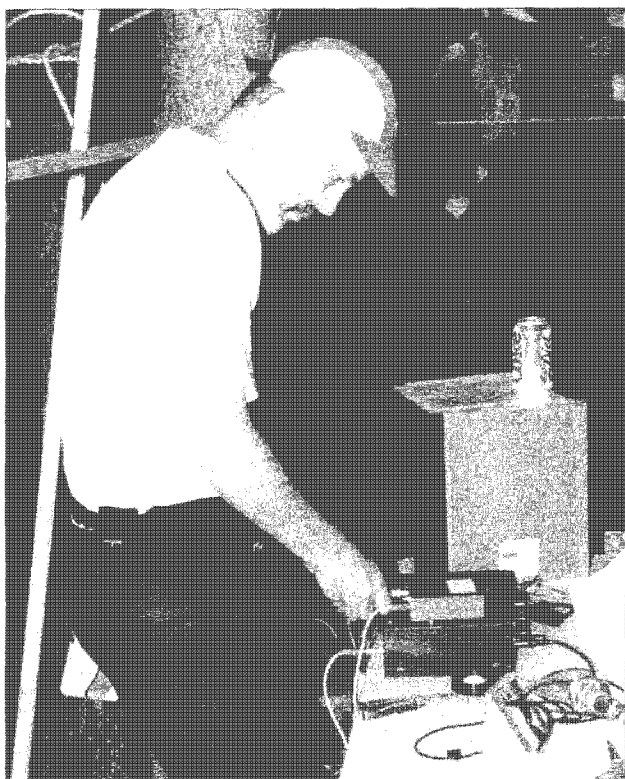
Less than nine months after the First USA ARDF Championships in Albuquerque,<sup>1,2</sup> hams from around the country have converged on another well-mapped forest to see who is best at this fast-growing specialty of amateur radio. The Second USA ARDF Championships took place April 19-21 at Franklin D. Roosevelt State Park near Pine Mountain, Georgia. Two dozen of the country's best radio-orienteers from 14 states were there.

Organizing and hosting the festivities were members of the Georgia Orienteering Club (GAOC). Sam Smith N4MAP (Photo A), who put on a challenging ARDF practice session a day before the New Mexico events began, volunteered to be responsible for all of the courses this time. Working closely with him was his wife Laurie Searle KG4FDM (Photo B), who ably served as this year's Meet Director.

### A perfect site?

Encompassing 9,000 acres, FDR Park is the largest in Georgia, with beautiful forest, two large lakes, and 37 miles of trails. No wonder orienteering is so popular there! GAOC has created excellent orienteering maps of all the wilderness areas. For fairness to out-of-towners, the club had put a four-month

*Continued on page 52*



**Photo A.** Sam Smith N4MAP adjusts the radios and PA system at the starting tent. He set all of the difficult courses at these Championships.



**Photo B.** Laurie Searle KG4FDM took time out from her duties as Meet Director to play her autoharp during a practice session on Friday.





*Photo C. After walking about 3/4 of a mile up the road, competitors arrived at the two-meter starting area early on Saturday morning. Their ARDF sets, which had been impounded upon arrival, were waiting on the tarp.*

## HOMING IN

*continued from page 51*

embargo on orienteering events in the sections to be used for the ARDF Championships.

Weather in Georgia can be very hot and very wet. Neither extreme was a problem during the championships. The thick forest made sunburn unlikely, as there wasn't a lot of sunlight at the base of the trees. At times, I had to resort to flash to get good photos. April WA6OPS, who watched for competitors as they broke into the clearing a hundred yards from the finish line, reported that the sudden glare was disorienting to some of them.

Category	Foxes	2m Gold	80m Gold
M21	5	Gyuri Nagi KF6YKN	Gyuri Nagi KF6YKN
M40	4	Jerry Boyd WB6WFK	Jackson Stump KD5OEO
M50	4	Charlie Siler KO4NO	Charlie Siler KO4NO
M60	3	Bill Farrell	John Munsey KB3GK
F21	5	Valerie Meyer WB8VAL	Valerie Meyer WB8VAL
F35	4	Debbie Pendley KD5LOK	Debbie Pendley KD5LOK
F50	3	Martha Carr	Martha Carr

*Table 1. Competitor categories and USA-only division gold medal winners.*

There were no bears (unlike Albuquerque) and no rattlesnakes (unlike southern California). Copperheads were an unlikely possibility and the poison ivy could be avoided by being watchful. The only bugs to worry about were the fire ants (Don't kick their mounds!) and the chiggers (Don't sit in the pine straw!).

Although these hunts were for national medals, they were open to anyone of any age, licensed or unlicensed. As you might expect, the competitors had a wide range of skills and expectations. Some of them had been doing the sport for years or decades and had competed in Regional or World Championships. They knew how VHF and HF radio signals propagate in a thick forest. Others, including all the Georgians, were relatively new hams or nonhams. However, they were old-timers at deep-woods orienteering. They were unlikely to get lost, but they were still discovering the fine points of radio signal tracking.

Quite a few had been to some practice sessions in local parks but had never been on a full-size ARDF course. Three from Albuquerque learned the mechanics of ARDF by putting on our first national championships last year, but they hadn't gone for the gold as competitors. There were even a few who had no idea what they were getting into. For instance, John Munsey KB3GK is an expert mobile T-hunter who has been featured on these pages for his hamfest hunt activities.<sup>3,4</sup> I encouraged him to come, and he brought fellow Floridian Bill Thomas KE4HIX with him. They researched

and selected suitable on-foot RDF gear for 80m and 2m, took to the courses, and surprised themselves pleasantly with their successes.

Many participants arrived by car, including Marvin Johnston KE6HTS, who drove all the way from Santa Barbara CA. Others came by air, usually through Hartsfield Atlanta International Airport, a hub of Delta Airlines. ARDF gear looks pretty strange and intimidating to nonhams, but nobody reported problems with security officers along the way. Most had wisely placed it inside checked baggage.

For those who arrived early enough on Friday, GAOC provided ARDF practice to help them get accustomed to a typical Georgia forest. It was two meters in the morning, with three foxes in a small corner of the park, then 80 meters in the afternoon with three more. For radio-orienteers who had never tried classic (nonradio) orienteering before, there was a regular GAOC O-meal in another area of the park on Saturday afternoon after the two-meter hunt, with an instruction session for beginners.

All competitors were instructed to be at the park by 8 a.m. Saturday for the two-meter hunt. Since some transmitters were already on the air, competitors couldn't be permitted to use their ARDF gear as they walked to the starting tent. They had to turn in all receiving equipment at the impound table as they arrived. Volunteers from the South Fulton ARES group handled all the impound duties, under the leadership of Ron Smith N4XQN. When a competitor arrived, the crew checked for unauthorized gear (such as GPS sets), put a nametag on the equipment and placed it with others in plastic tubs for safekeeping. The tubs were transported to the starting area, where the gear was carefully laid out on a bright orange tarp (Photo C).

Competitors were divided into the same age/gender categories as last year, five for men and four for women, according to rules of the International Amateur Radio Union (IARU). Table 1 shows the categories and number of foxes that were required to be found in each. Nonrequired foxes were marked out on competitors' punch cards so there would be no confusion. By IARU rules, any competitor may run in the prime age division for his or her gender (M21 or F21), finding all five foxes. Two men and one woman chose to do so — more on that later.

Hunters were started two at a time (each in different age/gender categories) at five-minute intervals. Times were published in advance on the Web so that each hunter





**Photo D.** Mike Pendley K5ATM, the OM of KD5LOK, was a bit exhausted after his two-meter run. He took silver in the M40 category.

would be sure to get to the tent in plenty of time.

GAOC's three-stage start was a bit different from the World Championships, but it was fair and went very smoothly. Seven minutes before each start time, as announced by beeps on the PA system, the pair of competitors came up to the table where their numbered bibs and competitor cards were checked. Two minutes later, they received their maps. Most quickly taped them to their own map boards to prevent loss.

With two minutes to go, they were instructed



**Photo F.** Debbie Pendley KD5LOK of Albuquerque is excited because she just finished the two-meter course, giving her a gold medal in the F35 category.

to leave the tent and proceed up the corridor to the starting triangle, where another official awaited. When they heard the next tones, they could turn on their gear and commence hunting. Their elapsed time started at that moment. If they weren't at the finish line within three hours, with at least one fox punched, they would be disqualified.

Some were much faster, of course. Best overall was Gyuri Nagi KF6YKN. He averaged 19 minutes per fox on two meters and just 15 minutes per fox on 80 meters. Gyuri, whose other call is HA3PA, is a part-time U.S. resident who learned the sport in his native Hungary. He has trained ARDF Team USA members for the World Championships.

### Green means grueling

Though very good, Gyuri's course times were far from his personal best. On both courses, he took 50% longer than he did in New Mexico last year, where there was more sun and much higher altitude. Does this mean that N4MAP's courses were harder? Indeed, that was the consensus among the hunters who had been to both events. Gyuri said that he had never been on a more difficult course. Some others used terms like "sadistic" to describe Sam's fox placement.

Let's compare: Sam's M21 courses (start to all five foxes, then to finish via direct route) were 6.2 and 5.7 kilometers long for

2m and 80m respectively, with 275 and 165 meters of climb. Jerry Boyd WB8WFK designed his 2001 Manzano Mountain Park M21 courses for 5.0 and 5.5 km length, with climb of 135 and 20 meters. Nobody said that Jerry's courses were too easy!

In orienteering terms, Sam set expert "green level" courses, with the foxes placed farther away from the trails. Confident competitors navigated all the way cross-country. Neophytes usually took longer routes via a combination of trails and short cross-country hops.

Orienteers are used to being instructed exactly where they have to go, planning a course to get there, and following it. For them, radio-orienteering requires a change of mindset, because they won't know exactly where they're going until they get there (except for the finish line). On the other hand, transmitter hunting hams tend to instinctively head directly toward the strongest signal, even though it would be more beneficial for them to study all of the fox signals, establish their most likely locations, then develop a plan to get to them and the finish with minimum time and effort.

For instance, many Pine Mountain competitors made the mistake of first going after foxes MOE or MOI each day, because of their strong signals. Since those two were closest to the finish, it would have been better to save them for last and plan a more



**Photo E.** John Munsey KB3GK of Daytona Beach didn't have to run to capture a gold medal on 80 meters in the M60 category.



efficient route to them via the others. It also helps to keep in mind the IARU course-setting rules, which require that no transmitter be within 750 meters of the start and that all must be spaced at least 400 meters apart.

Not far behind KF6YKN was Charles Scharlau NZØI of North Carolina. If there had been an award for Most Improved Hunter, he would have been a top contender. Although KF6YKN and NZØI have both had their 40th birthday parties, they chose to run in the M21 category instead of M40. Charles, who was in third place on both bands in M40 last year, took silver in M21 on both bands this time. His per-fox times on the more difficult Georgia M21 courses

were better than for his New Mexico M40 performances.

Taking bronze on both days in M21 was Csaba Tisztartó, another seasoned ARDFer who trained in Hungary and has competed in European championships. Like Gyuri, his 80m time was 50% greater than it was in Albuquerque, providing more evidence of the relative difficulty of the Pine Mountain course.

The M40 category had the most entrants, including all of the men from the Albuquerque area. The Duke City hams did very well, capturing all of the medals in that category except one. Snagging gold on VHF and bronze on HF was Jerry Boyd WB8WFK, who was Event Chair for last year's Championships and whose homebrew 80m ARDF receiver/antenna project has been featured on the pages of this magazine.<sup>5</sup>

The M40 gold medalist on 80m was Jackson Stump KD5OEO, with an impressive 25 minutes per fox. Jack, who also took bronze on 2m, is a newcomer to the sport. Mike Pendley K5ATM (**Photo D**) took silver on 2m and was 4th USA finisher on 80m. He had been in charge of housing, food, and meeting rooms for last year's USA Championships, but he didn't compete then. Taking M40 silver on 80m was Brian DeYoung K4BRI of Alexandria, KY, one of three OH-KY-IN club members in attendance.

Three veterans of the last ARDF World Championships and one experienced orienteer squared off in the M50 category. Charlie Siler KO4NO of GAOC streaked to the finish on both bands at least twenty minutes ahead of the others. Did he have a "home field advantage"? Maybe, but there's no doubt that he deserved his two gold medals. Taking silver was Bob Frey WA6EZV of Cincinnati, who had undergone an amazing weight-loss and training program in the past two years. Trading off for third and fourth place were Dick Arnett WB4SUV of Erlanger, KY and Marvin Johnston KE6HTS of Santa Barbara, each eager to earn a place on Team USA for this year's World Champs. Marvin got bronze on 2m and Dick got the medal on 80m.

John Munsey KB3GK walked to a silver medal finish in M60 on 2m and to a gold medal on 80m (**Photo E**). Capturing gold on 2m was Bill Farrell of GAOC, who found all three required foxes in under 85 minutes.

For the first time ever, YLs took to the woods in a USA national ARDF championship event. Earning gold medals on both bands were Valerie Meyer W8VAL in F21, Debbie Pendley KD5LOK (**Photo F**) in F35, and Martha Carr of GAOC in F50.

## Please pass the Parmesan

Good food is a tradition at ARDF events worldwide, and there was plenty of it in Pine Mountain. After the practice on Friday, the Neher family cooked everyone a fine picnic supper in the park. The ceremonial banquet was Saturday, after the two-meter event, in nearby Hamilton, Georgia. It was served by members of Christ the King Church, with all-you-could-eat spaghetti and desserts.

There's not enough room in this issue for all the photos and details from Pine Mountain that I'd like to show you. I have only mentioned the USA-only Division, but there was also a complete set of awards in the Overall Division. That will have to wait until next month. Team USA for the 2002 ARDF World Championships in Slovakia will have been selected by then. I may also be able to announce the dates and location for the next USA ARDF Championships.

Watch your mailbox for the next installment. Meanwhile, you can get complete results for every Pine Mountain competitor, including elapsed time and number of foxes found, by going to GAOC's radio-O champs Web site: [http://www.gaorienting.org/Radio-O/Radio.htm].

For more information on how you can get involved in ARDF, check back issues of *73 Magazine* and visit the "Homing In" Web site URL at the beginning of this article. There you will find information on upcoming events, local ARDF contacts, and equipment ideas. If radio-O hasn't caught on in your hometown, take the lead in getting it started. Happy hunting!

## Footnotes

1. Moell, Joe, "Homing In: ARDF Championships Part 1 — Triumph in the Land of Enchantment," *73 Magazine*, December 2001.
2. Moell, Joe, "Homing In: ARDF Championships Part 2 — The World Comes to Duke City," *73 Magazine*, January 2002.
3. Moell, Joe, "Homing In: T-Hunting Fun in the Sunshine State," *73 Magazine*, March 2002.
4. Moell, Joe, "Homing In: Take the Hamfest Foxhunting Challenge," *73 Magazine*, May 2002.
5. Boyd, Jerry, "You Can Build the FoxFinder 80," *73 Magazine*, November 2000.

**Correction:** In our June issue on page 46, all of the paragraphs in quotes preceding "All aboard for Slovakia" should not have been so. Our apologies to KØØV for this editing error.

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# Too Many Projects to Build

*Listen up, as a solder-stupefied ham reveals how to reach this nirvanic state.*

*You've waited impatiently for an entire month for your latest issue to find its way to your mail box. And while the articles presented are outstanding presentations, they just aren't what you're looking for. Nothing "jumps off the page," grabbing your attention, demanding to be built, or if the design is interesting, it's definitely beyond your capability or pocketbook.*

Not all builders have the needed expertise to build the "all-band, super-stompin' QRP rig of the century." Not to mention a fully outfitted shop rivaling those of NASA. Not to mention needing and/or wanting every rig/device/gadget/trick that graces the pages of 73 and the other ham rags every month.

Now, those are difficult words of to write about 73, but you know what I mean. Amateur radio is a hobby, and while it often occupies a major portion of our lives, it shouldn't take bread from the table. There must be an alternate solution to the problem, and I'm going to tell you of one.

Knowledge of another flavor is usually what we know the most about — electronics. Electronics construction and design is a "nice to know," and the challenge of building my own rig is a goal I set for myself. I'm working on it, but there's a long way to go before I don the cap and gown to gain my engineering degree.

That's not to say that either of us is lacking in knowledge. After all, you *are* reading a "technical hobby magazine," aren't you?

Let's establish a rule or two that will help us in our future building

endeavors. First, the word "can't" isn't to be used.

Yes, *you can build it* — you just don't know it yet.

I'm too old, vision ain't what it was, hands shake, etc. Well, you've just described me, so now what's *your* problem?

I don't have money for parts. For the answer to that, look in the dictionary under the word "poor," and I suspect you'll find my picture there.

There, I've eliminated some of the excuses used to avoid trying. Now, let's get on with searching for a project to build.

No, there isn't a shortage of designs for those hams not sporting an EE degree, nor is not having unlimited resources or equipment for building a major obstacle. Publishers are diligently searching for printable designs. They are, however, trying to please readers' desires in many areas of interest, at least once in a while. Therefore, not all interests can be addressed all of the time.

So what's a home-brew addict to do when the other guys and gals are being treated to their interests?

Back issues of periodicals are a good source of information. Perhaps you

didn't really read every article in last year's issues. Now would be a good time to survey them to refresh your memory as to what they contained. In 73, the January issue usually contains a listing of all the articles published for the preceding year. Using this as a guide can help you through 12 issues quickly.

Today's technology has provided us with a source of information that has changed all our lives. Various "buildable" projects are on the Internet, and often it's a case of not knowing where to look that is the hindrance. Not only are there a wealth of designs, but also the authors often are unparalleled leaders in their field! What better way to learn about designs than by learning from the leaders?!

Here's one suggestion: Go on the "Web" and read the information at [<http://harry.pmp3.net>]. His call sign is SMØVPO, indicating that he is from Sweden. Reading Harry's on-site personal information, he's an engineer employed by a major electronics firm and provides the information on his Web site to assist other hams. Now that's the true spirit of amateur radio!

*Continued on page 56*



## Too Many Projects to Build

*continued from page 55*

Harry's site not only provides "buildable" circuits using parts that aren't difficult to obtain, but it also offers excellent learning incentives for the new or old builder. There are many others producing e-information purely for the advancement of the hobby, and to provide encouragement for those of us who require it. Some sites offer basic electronics theory along with construction articles.

That site is only a suggestion. There are literally hundreds more to be found. Some of the other ones I use most often are [qrparci.org], [qrp.pop.net], and [njqrp.org]. These aren't the only ones — just those I have found to be beneficial when looking for receiver and transmitter designs. The Web addresses were current at this writing, but addresses have a way of changing without notice, so please bear that in mind.

Use the "links" selection at such URLs to lead you to other "like" Web sites. At my QTH the downside of Web surfing is time. Searching all these locations can take time, time you hadn't intended to spend on the computer! Especially when you find the locations from other builders who include pictures of their projects! The digital world has opened an opportunity for all the world to "look at mine." Oh, well, there is always a price to pay for everything. To save the location for future information, add the sites to your "favorites" section as you find them.

Don't overlook the articles about test equipment! Building your own signal generator, audio amplifier, and such can be not only rewarding but also useful in the future. There's just something about having built it yourself that adds to your ego.

### Later ...

So anyway, time has now passed, and reams of printed pages describing projects worthy of consideration have stacked themselves neatly after arriving from your printer.

Pictures of neatly built rigs built by other builders attest to their expertise

and cause envy to fester within your thoughts.

Alas, now another problem has been created! Too many projects to build, and not enough time to build them all!

Now is the time to be extra careful!

It's Murphy's Law that the next issue of your favorite builders' magazine will be "packed" with circuits just for you.

Like I said, "There's a price to be paid for everything." Happy homebrewing!

*(Editors' note: To ensure more circuits just for you, call us at 603-924-0058 and let us know what you are looking for!)*

## LETTERS

*continued from page 8*

NH. You just follow a few simple steps and then use your handheld keypad to key in your called party I link registration number. If you read the info on the site, you will soon understand the simple procedures and signal flow for a call.

This has to be the best system for amateur radio that I have ever seen. It is growing by approximately 100 new registrations per day. In our local area, a small county in SW VE1, we have seen approximately 12 hams join in less than one week. Give it a try and see what you think ... [http://www.aacnet.net/] (software here).

P.S. By the way, I love your editorials and we also follow your eating habits. Hi.

**Edwin Olsen W4GES.** My most recent lipid panel results are beautiful, and this without Lipitor or Zocor, or any other cholesterol-lowering drugs. I attribute this to following your dietary guidelines. Each of these drugs had had a very adverse effect on my liver. In the case of Zocor, it took months before my liver enzymes went back to normal. Thank you for your pioneering efforts in promoting good health.

## Ladder Crystal Filters for NBFM

*continued from page 19*

Also available from Barnes and Noble bookstores.

## Appendix

From page 38 of Reference 2, the

parallel capacitance (including holder capacitance) of a lower sideband ladder crystal filter is:

$$C_p = (C_x f_o / BW3) \times [(1/\text{rov3}) - (k_{12} + k_{23})] / [(1/\text{rov3})^2 - 1]$$

where  $1/\text{rov3}$  is the shape factor and  $k_{12}$ ,  $k_{23}$  are filter coupling coefficients. For a 6-pole Chebyshev filter,  $k_{12} + k_{23} = 1.255$ . Rearranging the equation above, the bandwidth at 3 dB down is:

$$BW3 = C_x f_o K / C_p$$

where  $K$  is the complicated fraction on the right. This is the equation used to generate **Table 1**. For a shape factor of 5, 7.5, or 10,  $K$  equals 0.156, 0.113, or 0.0883, respectively. If  $C_p$  is completely canceled, then the bandwidth can be very large. However, in practice there will always be some stray capacitance and variations with temperature, which result in some small capacitance. Hence **Table 1** does not go below 1 pF.

## Easy-Build Project of the Month

*continued from page 23*

so-called "phantom" power draw. This is present even if the on/off switch is in the off position. The wall converter is still using a no load power level. This amounts to nearly nothing and is of no concern if you have a main power switch to your workbench. I have made it a practice to use a wall switch to turn off power to my work bench when it is not in use. The work bench lights are my indication that everything is off.

Well, it is my hope that folks will build one of these units and a bread-board and start a little experimenting. There are some neat things behind the switches and dials of that appliance sometimes called a "rig." Good luck!

## References

1. *Ham Radio*, July 1978, p. 36.
2. *Ham Radio*, January 1978, p. 95.
3. *Ham Radio*, July 1989, p. 20.



## Sources

1. Jameco Electronics, catalog: 1 (650) 592-8097.
2. Hosfelt Electronics, catalog: 1 (800) 524-6464.
3. Digi-Key Corp., catalog: 1 (800) 344-4539.
4. Mouser Electronics, catalog: 1 (800) 346-6873.
5. Far Circuits, 18N640 Field Ct., Dundee IL 60118.
6. Ten-Tec, Inc., catalog: 1 (800) 231-8842. 73

## Tesla's Champions

*continued from page 28*

we know as radio. Marconi, Fessenden, Braun, Alexanderson, and others should be credited with the development of radio, not its creation.

FINN suggested: "creating a future extensive exhibit to expand his treatment of AC systems."

WAGNER: Even a casual observation of the electrical displays at NMAH clearly points to the fact that Thomas Edison is Dr. Finn's personal hero. Further, examination of data bases shows that he has written no fewer than ten papers and articles on the subject of Edison.

Noting the history of the AC/DC "war" that has been written about in numerous articles and biographical accounts of Tesla — a war of ideas between Tesla advocating AC and Edison tenaciously resisting its introduction, clinging desperately to DC, is it reasonable to assume that Dr. Finn could provide objective oversight for such an exhibit at the Smithsonian's NMAH?

## Concluding comment

Great men think profoundly, say great words, and make great contributions to humanity. Certainly Nikola Tesla was one of these great men as evidenced by what he thought, what he said, and what he accomplished for the greater good of everyone. One statement he made stands out in my mind, which serves to illustrate the degree of commitment Tesla had as a man and as a scientist: "My paramount desire today,

which guides me in everything I do, is an ambition to harness the forces of nature for the service of mankind." Tesla, in his lifetime, did accomplish his goal, and we are all the better and richer for it. If any man serves as a model for emulation, it is Nikola Tesla, but if somehow we lose track of his life story, then we will become the poorer.

My students and I are committed to our efforts of reintroducing Tesla to the academic community as long as we are able. Nevertheless, we realize that we cannot do this job without the help of others; therefore, we beseech everyone who understands and appreciates what we are doing to give us the support we need to continue.

*John Wagner WSAHB can be reached at 3890 Tubbs Rd., Ann Arbor MI 48103.* 73

## Travels with Henryk — Part 6

*continued from page 36*

I met Santos again a few months ago, but in the Cape Verde Islands, off the coast of Africa. He was on the D44TC team in 2001 CQ WW Contest SSB. But that is another story. 73

## What Amateur Radio Means to Me

*continued from page 37*

dummy load, headphones and most of my other station accessories. The next items I plan to add are a linear amplifier that will increase my input-output wattage from 100 watts to 1300 watts and a taller tower for my antenna. The linear amplifier I am planning on is manufactured by a sister company of MFJ.

All in all, it is better to be talking to and making friends with thousands of people worldwide than a few hundred people in your own area. I can truly say that amateur radio has done a lot for me!! 73

**Say You Saw it in 73!**

## CALENDAR EVENTS

*continued from page 40*

19th until 8 p.m. EDT July 20th. Frequencies will be 28.350, 21.330, or 14.340. A nice certificate is available with an SASE. QSL to SREL, 2909 W Perkins Ave., Sandusky OH 44870.

**AUG 10, 11**

**MARYLAND-DC QSO PARTY** On the air 1600–0400 UTC August 10th to 11th, and 1600–2359 August 11th. Suggested frequencies: 3.643, 3.92, 7.07, 7.23, 14.055, 14.268, 21.115, 21.37, 28.055, 28.38, 50.15, 52.525, 146.55, 146.58 and 446.00 MHz. Try CW on the odd half hours. Scoring: Add up your QSO points and multiply by the sum of the multipliers. Multipliers may be claimed once each and they do not repeat from band to band. QSO Points: 10 points per club station, 5 points per mobile station, 4 points per QRP station, 4 points per Technician station, 3 points for a CW QSO, 1 point all other QSOs. Remember, only the highest single point value may be applied per QSO. Multipliers: For stations outside MDC: 1 per MD county + DC + Baltimore City (25 possible). For MDC Stations Only: The basic 25 above + each of the other 49 US states + each DX country. Note: An optional scoring/summary sheet that makes scoring easy is available for an SASE. This is available from Antietam Radio Association and at the Web site. Certificates are awarded to all stations with 50 or more QSO points in their entry. Please visit the Maryland-DC QSO Party Web site at [www.w3cwc.org]. Send logs and scoring summary with an SASE by September 20th to the contest primary sponsor, Antietam Radio Association, P.O. Box 52, Hagerstown MD 21741-0052. Logs can also be E-mailed in plain text format to [wa3eop@arrl.net]. A Special Award — The Worked All Maryland Multipliers Award — has yet to be claimed. Last year W3LRC almost did it with 24 of 25 worked. WA3HAE accomplished that the year before! Who will be the first person to do this? The only stipulations are: 1) all contacts must be from a single QTH, 2) all contacts must be made during a single year's QSO party. Donations towards the continued operation of this activity are always welcome and may be sent along with hard copy entries to the primary sponsor. See you in the pileups. Page WA3EOP.

**AUG 17, 18, 19**

**NEW JERSEY QSO PARTY** The Englewood Amateur Radio Association, Inc. invites all amateurs the world over to take part in the 43rd Annual New Jersey QSO Party. Rules: (1) The time of the contest is from 2000 UTC Saturday, August 17th to 0700 UTC Sunday August 18th, and from 1300 UTC Sunday August 18th to 0200 UTC Monday August 19th. (2) Phone and CW are considered the same contest. A station may be contacted once on each band — phone



and CW are considered separate bands — CW contacts may not be made in phone band segments. New Jersey stations may work other New Jersey stations. (3) General call is "CQ New Jersey" or "CQ NJ". New Jersey stations are requested to identify themselves by signing "De NJ" on CW and "New Jersey calling" on phone. Suggested frequencies are 1810, 3535, 3950, 7035, 7235, 14035, 14285, 21100, 21355, 28100, 28400, 50-50.5, and 144-146. Suggest phone activity on the even hours; 15/10 meters on the odd hours (1500 to 2100 UTC); 160 meters at 0500 UTC. (4) Exchange

consists of QSO number and QTH state/province or country. New Jersey stations will send county for their QTH. (5) Scoring: Out-of-state stations multiply number of complete contacts with NJ stations times 3 points per QSO times the number of New Jersey counties worked (maximum of 21). New Jersey stations multiply the number of complete contacts times 3 points per QSO times the multiplier. The multiplier is the sum of the number of states (other than NJ), Canadian provinces, and NJ counties worked. Maximum is  $49 + 13 + 21 = 83$ . (6) Certificates will be awarded to the first place

station in each New Jersey county, state, province, and country. In addition, a second place certificate will be awarded when four or more logs are received. A total of two plaques have been donated by the ARRL Section Managers for NNJ and SNJ to the highest scoring single operator station residing in each of their sections. (7) Logs must also show the UTC date and time, QSO exchange, band, and emission, and be received not later than September 14, 2002. The first contact for each claimed multiplier must be indicated and numbered and a check list of contacts and multipliers should be included. Multi-operator stations should be noted and calls of participating operators listed. Logs and comments should be sent to: Englewood Amateur Radio Association, Inc., P.O. Box 528, Englewood NJ 07631-0528. A #10 size SASE should be included for results. (8) Stations planning active participation in New Jersey are requested to advise EARA by August 1st of your intentions so that we may plan for full coverage from all counties. Portable and mobile operation is encouraged. 73

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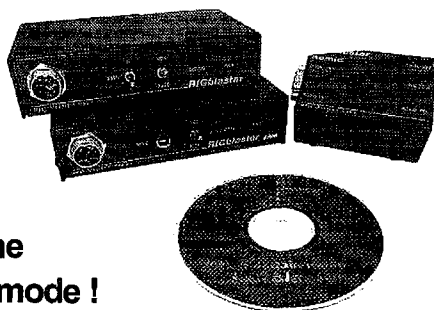
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## THE DIGITAL PORT

*continued from page 44*

platforms superseding Win98. There is a downside to this Win98 step. There are also programs being written that will not run well unless you have XP installed.

There is a solution if you are the sort of ham who has to have it all. You can get some plug-in hard drives and put different operating systems on each of them and install the software that works where it is most comfortable. The one operating system most will agree not to have is Me.

Now there are a certain number of programs that run very well on Me. DigiPan and MixW do. Zakanaka and Logger are supposed to communicate with each other when they are both up and running. They will not do this under Me. But they work flawlessly under Win98.

I got so disgruntled with finding some of my favorite programs would become dysfunctional under Me that I was ready to jump at the idea of installing the Win98. Another program that got the hiccups with Me was my antiquated yet adequate Word 6 (from Microsoft) that runs just great again under Win98.

The experiments will continue. I have a lot of ham software that will work its way onto this hard drive as time slips by. Most everything I have experience with will most likely fly as expected.

One of my favorite older pieces of software is XPWin, which was written by KF7XP. This is another fatality of the Microsoft juggernaut as it builds "new and



improved" operating systems. The story I get is the author found his software needed to be updated to "keep in step with the times" and he just simply took it off the market. Another notch in the MS belt, I guess. That's it for this month. If you need help with these ideas, feel free to drop me a line at [KB7NO@worldnet.att.net]. 73, Jack KB7NO. 73

## ON THE GO

*continued from page 48*

getting his or her work published. After the article is complete the editor looks at the article with a fresh set of eyes and fixes a myriad of problems. The author knows what he means and what he meant to write. The editor reads what is actually written and can make sure that it actually says what it should. If you decide to try your hand at writing, the editor will take what you write and polish it where needed.

Somewhere out there, I suspect that at least one of you has been toying with the idea of writing an article. As hams we always have something to say, so it's a natural extension that some of us are going to put our thoughts in writing. Who's going to give it a try? 73

## HAMSATS

*continued from page 50*

Saudisat 70-cm downlink antennas are LHCP (left-hand circular polarization).

In his initial E-mail to AMSAT president VE3FRH, Turki Al-Saud announced that initial ham operation would be limited to passes over the United States and Saudi Arabia. By closely monitoring the load on system resources, it may be possible for the control station at SRI to open activity to include other parts of the world. Saudisat 1B (SO-42) is not yet available on the ham bands. Work with the other onboard experiments and software development has been the priority. Both satellites are capable of 9600-baud digital store-and-forward operation, but until further notice, we will be quite satisfied with the added resource of SO-41 as an FM repeater in the sky.

## From Russia and Australia with Kolibri

As noted in the May "Hamsats" column, a new educational satellite this year was Kolibri (hummingbird), a Russian/Australian project for students at the Ravenswood

Girls School and Knox Grammar School in Sydney, Australia, and the Obninsk school system through the Center of Computer Technologies at the Institute of Atomic Power near Moscow, Russia. This small satellite, also known as Kolibri-2000 or RS-21, had a primary downlink on 145.825 MHz with CW telemetry. Due to the low orbit of Kolibri, it reentered the atmosphere after only 711 orbits.

Kolibri was remotely launched from the Progress M1-7 ISS resupply vehicle within hours after separation from ISS Russian Service Module Zvezda on March 20, 2002. The satellite weighed 20.5 kg and had deployable solar panels capable of generating 60 watts at peak illumination. Onboard systems included particle and electromagnetic field analysis experiments and an AC magnetometer. The satellite's computer took care of data acquisition, housekeeping, telemetry, thermal and attitude control. The primary command station for Kolibri was located in Kaluga, Russia, with another site in Tarus, Russia.

Shortly after Kolibri was released, hams reported reception of CW telemetry on 145.825 and 435.335 MHz. The telemetry was sent as alphanumeric code groups at 10-second intervals. This made it a bit difficult to second-guess Doppler shift in between the transmissions, but signals were usually quite strong, when the satellite was transmitting. Operation was intermittent during its short life. An example of telemetry received at 2054 UTC on April 28, 2002, on a downlink of 145.825 MHz, included: ITXA0 PTXA0 TTXA136 ITXB3 PTXB0 TTXB138 TFLV130 TFLN144 TPPA136 TPPB136 MTX51 MRX34. **Table 1** shows some of the telemetry decoding equations for Kolibri as provided by Miles Mann WF1F on his Web site [<http://www.marex-na.org>].

Kolibri was just the first in a series of small educational and experimental satellites from the collaborative efforts of groups in Russia and other countries for launch from ISS and Progress space vehicles. A group that has been involved with recent RS programs is AMSAT France (AMSAT-F). On May 3, 2002, two very small (6 kg each) AMSAT-F satellites reached orbit on Ariane Flight 151. The primary payload was a 3,000 kg imaging satellite, SPOT 5. The launcher was the workhorse Ariane 4 rocket. The French hamsats are called Idefix. They were set to transmit recorded voice messages and digital telemetry on 145.840 and 435.270 MHz through the end of June, when the batteries were predicted to give out. There are no solar panels. As with the Kolibri project, more small satellites are expected from AMSAT France in the future. Yes, it's a challenge just to keep up! 73

## NEVER SAY DIE

*continued from page 4*

kids are able to learn this new way of reading. Every school in the country should be teaching this.

How about kids with dyslexia or ADD? They have no problem with what George calls Natural Reading. The parents of kids with dyslexia, ADD or hyperactivity should stop feeding their kids poisons so these problems would go away.

This is the best answer I've seen to the growing illiteracy problem, where nationally our kids have been falling further and further behind in their reading skills compared to kids in other developed countries ... countries which spend far, far less on education.

Yesterday (a Saturday) I spent the afternoon driving around Hillsborough (NH) taking pictures of the yard sales all around the town. Must be over a hundred of 'em. I was working on an article for my new magazine, NH ToDo. In addition to picking up an almost new Akai cassette deck for \$5, I picked up dozens of interesting books for only a quarter each.

I also picked up a dozen I want to read at the Hancock town dump (called a transfer station these days), where there are always hundreds of books up for grabs ... with new ones appearing almost every day. The same goes for the Peterborough town dump.

Another source of bargain books is library sales. I'll drive an hour for one of those. They often have thousands of books going for 10¢ to 50¢ each.

## Do It Yourself

You can learn to speed read at any age, it just takes a lot longer to retrain your brain when you're a teen or older.

*Continued on page 61*

### Smart Battery Charger

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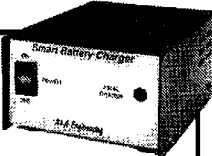
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## D is for Doldrums

*July is often a challenging period for DXers, and this month will be no exception. Since the noontime sun is high in northern skies, we can expect strong D-layer ionization to weaken signals on the daytime bands. We are also still seeing a large amount of solar activity, and so will probably experience greater than normal signal absorption.*

The lowest bands would normally be your best bet here, since they require less power to achieve adequate signal strength, but the daily Maximum Usable Frequency (MUF) will probably limit you to 15, 17, or 20 meters.

The nighttime bands will also be limited, but for different reasons. They will primarily be affected by the short duration of darkness and by atmospheric static generated from strong convective storms. In this case, 20 and possibly 30 meters will be the most workable bands.

Together, these day and night conditions characterize the summertime "doldrums" by reducing the usable bands to a narrow range of choices. However, this is a time when CW "fists" have a definite advantage over voice-only operators since Morse code can be copied with a signal-to-noise ratio as low as 3:1, allowing wider use of the HF frequency spectrum.

A speech quality single-sideband (SSB) signal with a 3 kHz bandwidth typically requires a signal-to-noise ratio of at least 7:1 to be readable, so this should be a good incentive for those with voice-restricted tickets to study for the code test.

As far as this month's solar prediction goes, my crystal ball indicates that the first third of July will be erratic with just a few Fair-to-Good (F-G) days to work with. Decent HF propagation conditions should finally appear around the 13th but will only last about a week.

Solar activity will then increase significantly, with strong flares probable from the 20th through 24th. The 26th should begin a period of generally favorable conditions, especially for midlatitude operators, but high latitude stations will continue to have some difficulties through the end of the month.

July 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
	1 F-G	2 F	3 F-P	4 F-G	5 F-G	6 F
7 F-P	8 F-P	9 F	10 F-G	11 P	12 F	13 F
14 G	15 F-G	16 G	17 G	18 F-G	19 F	20 P
21 VP	22 P	23 VP	24 F-P	25 F	26 F-G	27 F-G
28 F-G	29 F-G	30 G				

EASTERN UNITED STATES TO:																
Country	15-20	(15) 30	20 (40)	(20-40)	(20)	(20)	(20)	(15)	(15)	15 (20)	(10) 17					
Central America	15-20	(15) 30	20 (40)	(20-40)	(20)	(20)	(20)	(15)	(15)	15 (20)	(10) 17					
South America	15 (20)	(15) 20	20 (40)	(20-40)	(20)	(20)	(20)	(15)	(15)	(10) 20	(10) 20					
Western Europe	20	20	(20-40)	(40)	(20)	(20)	(20)	(15)	(15)	(10) 20	(10) 20					
South Africa	x	(40)	x	(20)	x	x	x	(15)	(15)	x	x					
Eastern Europe	20	20 (40)	(20)	x	x	x	x	(15)	(15)	(15) 20	(15) 20					
Middle East	20	20 (40)	(20)	x	x	x	x	(15)	(15)	(15) 20	(15) 20					
India/Pakistan	(15-20)	(20)	x	x	(20)	x	x	x	x	x	x					
Far East	(15)	x	x	x	x	x	(20)	(15-20)	(15)	x	x	(15)				
Japan	(15-20)	x	x	(20)	x	x	(20)	x	x	(15)	x	x				
Southeast Asia	(15)	x	x	(20)	x	x	(20)	x	x	(15)	x	x				
Australia	(15)	(15)	x	x	(20-30)	(20-30)	(20)	(20)	x	x	x	x				
Alaska	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	(15)	(15-20)				
Hawaii	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	x	(15)				
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(15) 20	(10) 20	(10-20)	(10-20)	(10-20)	(10) 20				
CENTRAL UNITED STATES TO:																
Country	(10) 20	(15) 30	20 (40)	20 (40)	(20-40)	(20)	(20)	(15) 20	(15-20)	(10-20)	(10-20)	(10) 17				
Central America	(10) 20	(15) 30	20 (40)	20 (40)	(20-40)	(20)	(20)	(15) 20	(15-20)	(10-20)	(10-20)	(10) 17				
South America	10 (20)	(10) 20	(15) 30	(15) 30	(20-40)	(20)	(20)	(15)	(15)	(10)	(10-15)	(10-20)				
Western Europe	(15) 20	20	(20-40)	(20-40)	x	(20)	(20)	x	x	x	x	(15-20)				
South Africa	x	x	(40)	(20-40)	(20)	x	x	x	(10-15)	(10-20)	(20)	x				
Eastern Europe	(20)	(20)	(20)	(20)	x	x	(20)	(20)	x	(15)	(15-20)	(15-20)				
Middle East	(15-20)	(20)	(20)	(20)	x	x	x	x	x	x	(20)	(20)				
India/Pakistan	(15-20)	(15-20)	(20)	x	x	x	(20)	x	x	x	x	x				
Far East	x	(15)	(15)	x	x	(20-40)	(20)	20	(20)	x	x	x				
Japan	(15)	(15)	(15-20)	(20)	x	x	(20)	(15-20)	(15)	(15)	x	x				
Southeast Asia	(15)	(15)	(15)	(15)	20	(20)	(20-40)	20	(20)	x	(15)	x				
Australia	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(20-40)	(15) 40	(10) 40	(10-40)	(10) 40	(10) 40				
Alaska	(15-20)	15 (20)	(15-20)	20	20	(20)	(20)	(20)	x	x	x	(15)				
WESTERN UNITED STATES TO:																
Country	(10) 17	(15) 20	(16) 20	20	(20)	(20)	(20)	(20)	(20)	(10-20)	(10-15)	(15-20)				
Central America	(10) 17	(15) 20	(16) 20	20	(20)	(20)	(20)	(20)	(20)	(10-20)	(10-15)	(15-20)				
South America	(10-20)	(10) 17	15-20	(15) 20	(20)	(20)	(20)	(15)	(15)	x	(15)	(10-15)				
Western Europe	(15-20)	(20)	20	(20)	x	x	x	(20)	(15)	(15)	(20)	(15-20)				
South Africa	x	x	x	(20)	(20)	x	x	(20)	(20)	(15)	x	x				
Eastern Europe	(15-20)	(20)	(20)	(20)	x	x	x	(20)	x	x	x	(15-20)				
Middle East	(20)	(15-20)	(15-20)	(20)	x	x	x	x	x	x	x	(20)				
India/Pakistan	x	x	(15)	x	x	x	x	(20)	x	(15)	x	x				
Far East	(15)	(15)	(20)	(20)	(20)	(20-40)	(20-40)	(20)	(20)	(15-20)	x	(15)				
Japan	(15)	(15)	(15)	(15)	x	(20)	(20)	(20)	(15-20)	(15-20)	(15)	x				
Southeast Asia	(15)	(15)	(15)	(15)	20	20	20	(20)	20	(20)	x	(15)				
Australia	(10) 40	(10) 40	(10) 40	(15) 40	(20) 40	(20-40)	(20-40)	(15) 40	(10) 40	(10-40)	(10) 40	(10) 40				
Alaska	(10-15)	(10-20)	(10-20)	(15-20)	20	20	(20-40)	(20-40)	(10-15)	x	x	(10-15)				
Hawaii	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(20-40)	(15-20)	(10) 20	(10-20)	(10-20)	(10) 20				
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(20-40)	(15-20)	(10) 20	(10-20)	(10-20)	(10) 20				

**Table 1. Band, time, country chart.** Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



## Band-by-Band Summary

### 10 and 12 meters

When open, reliable paths will mostly lead you to the Caribbean, Latin America, and South America. Rarer contacts may sometimes be found in Africa or the Southwest Pacific. Expect signals to peak in the morning or late afternoon, and don't forget that these bands can stay open well into the evening at this time of year. Expect short-skip to fall between 1,000 and 2,000 miles.

### 15 and 17 meters

These bands can often be worked to diverse areas of the globe throughout the day, but plan on the strongest signals occurring to the east in the early morning and to the west in late afternoon. Look for openings past local sundown, especially when sporadic-E has been noted. Look for short-skip out to 2,300 miles.

### 20 meters

Good daytime DX will be possible but the strongest signals will be limited to relatively short periods after sunrise, in the late afternoon, or in the early evening. Decent nighttime DX will also be possible, especially to the west and northwest. Expect short skip to vary from 500 to 2,000 miles during the day and from 1,000 to 2,300 miles at night.

### 30 and 40 meters

Some good worldwide DXing can be had throughout the night as long as atmospheric noise isn't too great, but static from nocturnal thunderstorms will probably be frequent. Daytime openings can be worked in North America, Canada, and Mexico, but skip will be limited to 600 miles or so. At night, skip will fluctuate from 500 to over 2,000 miles.

### 80 and 160 meters

High static will mask signals on these bands most of the time, but occasional weak openings may occur between sunset and sunrise. Look for peaks near midnight and in the predawn hours. Short skip will vary from 1,000 to 2,000 miles.

That's all for this time. ... Have a safe and happy Fourth of July!

## NEVER SAY DIE

*continued from page 59*

The best way to get started is to get some large print books from your local library, such as the large type editions of the *Reader's Digest*. Then start scanning the pages, taking maybe five seconds to a page, and see how much you can remember after scanning a few pages. Do this every day for at least a half hour. It's going to take persistence, since this is a whole new way of reading and your right brain is going to have to rewire itself to deal with it.

The prize, after a month or so, is being able to read a couple books an hour, with good comprehension.

With some books you'll have to go back to your old, slow, way of reading. You don't scan in computer manuals like you do a novel.

### The Scanning Technique

Once you've read a book, whether by speed or slow reading, there's a memory trick you can use to keep the whole book fresh in your memory indefinitely.

What you do, with the help of someone else, is to get comfortable, close your eyes and then tell your partner everything you can remember in a book you've just read. Go through it in detail.

Now, silently scan through the book again in your mind, telling your partner about anything new that you've remembered this time through.

Do this all over again, voicing any new memories. To help you, your partner can stop you now and then, asking where you are in the book at that moment.

After a half dozen or so scans you'll be scanning through the whole book in a few seconds.

Every few months take a few minutes to mentally rescan through books you've scanned. This helps refresh the memory circuits ... just like a computer.

We have an unbelievable memory capability, it's just that we get used to not using it. My grandfather had whole books of poems memorized. And Frank French quoted for over a half hour from Maurice Gottschalk's diaries at his performance of Gottschalk's music at a Fresno Ragtime Festival.

### Reverse Speech

This whole business of finding hidden messages by listening to speech played backwards didn't make a lot of sense to me, so I haven't been a big fan of the technology. Yeah, I've heard some reverse speech via the Art Bell show, but it wasn't very clear.

That's suddenly changed.

By chance I picked out a book I'd gotten a year ago and started reading. It explained that our eyes see everything upside down and our brain has to learn to turn it over for us. It said that scientists believe that the right side of the brain receives language backwards and that children first start to speak backwards. It said that recordings of baby-talk gibberish played backwards revealed intelligible speech.

So we may well have the left side of our brain producing what we want people to hear, with the right side of the brain sneakily revealing what we really think.

Hmm, I see a market for tape recorders that can play backwards so parents will be able to talk with their babies sooner.

Say, that right side of the brain is the same one kids can learn to use to speed read. Maybe it's about time we stopped neglecting the development of half our brains.

### Kicking Ol' Nick

Why'm I such a nut on smoking? Coupla reasons. First, my dad smoked until he was about 65 and then spent the next 20 years living and sleeping with oxygen bottles before emphysema finally killed him. Second, almost every friend I've had down through the years who smoked is now long gone. Heart attacks, stroke, lung cancer, and so on. Most died in their late 50s.

Smoking is directly responsible for 87% of lung cancer cases. It also ruins the teeth. It makes men impotent in their 50s. Yet less than half of the smokers are trying to quit. Maybe they've read the statistics that only one in 40 actually succeed?

It's the nicotine-altered brain chemistry that makes it so difficult. It robs smokers of their free will. They're addicts to the drug, making it one of the most difficult to kick. Check out page 39 of the June 2002 *Popular Science* for the details of the chemistry involved.

Hey, if I make some "I'm Stupid" stickers available for you to walk up and stick on kids who are wandering around the malls smoking, would you have the guts to go ahead and use them? Youngsters are stupid to take on a lifetime, expensive, killer drug addiction. Older smokers are just to be pitied for having been so stupid as kids.

### Toddler TV

Wouldn't you know that researchers have found one more way that we're dumbing down our kids? And it's permanent! Yep, it's that ogre television. At that window of time when babies brains are normally busy building the circuits

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for body coordination, for talking and playing, they're sitting there stupefied, watching Sesame Street.

This brain-building period is a one-time deal — a use it or lose it opportunity.

How bad is it? A study in Cincinnati found that 40% of the two-year-olds watch more than three hours of TV a day!

Sure, TV is a great opiate for frazzled mothers trying to cope with a baby that's into everything almost every waking minute. Sit 'em down and hypnotize them with TV. And ditto day care centers, where there are rows of toddlers staring for hours at the screen — but not toddlers.

There are no second chances when it comes to early brain building. Recent success in giving babies born blind their eyesight as adults has shown that they will never be able to actually see as the rest of us do. The brain neurons were never developed for it. They can't recognize anything.

I hope more research is done in this area so we'll have an idea of how many IQ points we're permanently shaving off kids' brains by using TV as a pacifier. Duh?

### Smart ETs?

Because of science and technology, our world has changed more in the past hundred years than in the previous hundred centuries. Yet, for some weird reason the scientific establishment, along with the media and politicians, haven't grasped the ramifications of our sudden development.

Between UFO and contactee studies, anyone who has bothered to read the research reports knows that ETs are here — and have been for a long time. We also know that to get here their technology has to be way ahead of ours. Way, way ahead.

So why aren't they landing on the White House lawn — other than the Secret Service would immediately blast them to smithereens? That's easy. They're intelligent and thus they're well aware of how we treat strangers.

Are they a danger to us? Our military obviously think so. But if they were, with their technology they could have wiped us out long ago. It would be worse than the battle of Omdurman in 1898, where a handful of British, led by Sir Herbert Kitchener, wiped out over ten thousand khalifa with their Maxim machine guns, and a loss of about 400 men. And no Bruce Willis to save our asses.

As Arthur C. Clark's *Third Law* says, "Any sufficiently advanced technology is indistinguishable from magic." And that leads to Michael Shermer's *Last*

*Law*, "Any sufficiently advanced extraterrestrial intelligence is indistinguishable from God."

Would Captain Kirk and his crew want to mess with a planet where the occupants were busy killing hundreds of millions of their people—other maybe to observe the carnage?

### School News

The teacher unions have been pushing hard, spending millions to promote smaller classes (since that means more teachers), and with considerable success. Between 1969 and 1997 the number of students per teacher in public and private schools has gone from 25.1 to 18.3 — more than a 27% gain (and 27% more union dues). So what's been the change in academic performance? Kids' SATs have been steadily dropping.

But then, there are other factors which muddy the water, such as the huge increase in single-parent homes, which has gone from 15% in 1970 to 32% in 1995.

Asian kids are leaving ours behind in the dust, and their classes run about 40 students per teacher. On standardized science and math tests our high school kids rank somewhere between Greece and Lithuania, and way behind Albania.

Almost everyone, legislators included, are looking for a quick fix. As usual. Like our health, never mind what's causing the illness, let's do something so we won't feel the pain we're causing ourselves. The aspirin of smaller classes hasn't eased the educational pain. Nor will paying teachers more. That's been tried. Over and over.

Like our health problem, it's going to take an educational lifestyle change to stop the pain. Which is what I've been preaching for some time now.

### Lock 'em Up!

Another first for America: Two million prisoners! That's more prisoners than farmers (1.9 million), a quarter of all the prisoners in the entire world — and we've been able to accomplish this feat with only 5% of the world's population.

Though blacks make up only 13% of our population, roughly half of our prisoners are black. And about two-thirds of our prisoners are there on drug charges.

This mess is costing us about \$60 billion (that's about \$250 out of my pocket every year) and it's mainly the result of our lousy public school system. There are very few well-educated people in prison, if that tells you anything. And, once there, the education people get is in crime and diddling the legal system — not in how to read and build successful careers in our society. Our legislators, having not noticed that socialism has

failed in every country it's been tried, have saddled us with a socialist school system.

Our teachers, protected by their unions, have as much incentive to excel as the clerks in communist country stores, where customers are looked upon as nuisances to be ignored.

Many blacks have the worst of the deal, with uneducated single mothers and no father figure, living in inner cities where you either join a gang or get killed, and where education or talking English are considered "being white" and to be avoided. It's no wonder we're paying dearly to lock over a million of 'em away out of sight.

Will we wait until we have three million prisoners to admit that we have a problem and start considering some changes in the system that's causing it?

My vision is of building a new educational system which will eventually destroy the current failed model, replacing it with one where, from birth to death, people will be busy educating themselves, loving every minute of it, and at a fraction of today's school costs.

A better education certainly would help reduce the number of black unwed mothers, mostly teenagers, which account for 60% of black births!

I estimate that it'll only cost about \$750,000 to get this movement started. Hey, Bill Gates! Bono? Jobs?

### WWIII?

There's good reason to suspect that WWII has already started, but we just haven't noticed. Oh, the World Trade Center got our attention — at least for a few days — then it was back to *Frasier*, *Texas Justice* and *Judge Judy*.

Meanwhile, way off our radar screen have been reports on *60 Minutes* and other exposé shows on the millions of illegal immigrants crossing our borders, tons of drugs being brought in, and our Immigration Department having no clue about where thousands of Muslim visitors with student, visitors or no visas have disappeared.

Hasn't anyone read about that Trojan Horse caper?

Hey, why should an enemy mount a Pearl Harbor-type attack when they can, for a tiny fraction of the cost and danger, hit us with a thousand mini-Pearl Harbors all around the country, using an infiltrated sleeper army?

We know there are thousands of Muslims here from Iraq, Saudi Arabia, and other Mid-Eastern countries, many brought up from birth to hate America. We know that bioweapons are an incredibly cheap

*Continued on page 64*



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Blood Purifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! \$10 (#01)

**Plant Growth Stimulator:** This has the same circuit as the above, all ready to use. Postpaid: \$155 (#PGS).

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life

aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the *Drum*. \$5 (#10)

**Travel Diaries:** You can travel amazingly inexpensively — once you know the ropes. Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under \$1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. \$5 (#11)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. Yes, of course we pay for your articles! \$0 (#78)

**Wayne's Caribbean Adventures:** My super budget travel stories — where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32) No, I'm not a nut case.

**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gottschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. As an iconoclast I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

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**Colloid Reprint.** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Clips.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)  
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**Stuff I didn't write, but you need:**  
**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)  
**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs — such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax — a capping blow for René's skeptics. \$25 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon and wondered at their weird gate. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of give aways that the photos and films had to have been faked. With our gov't it seems to be just one cover-up after another. \$40 (#93)

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This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

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## NEVER SAY DIE

*continued from page 62*

way to kill large numbers of people. We know that suitcase atomic bombs can easily be brought into America, awaiting an attack day.

We also know that the FBI and CIA both have long records of unbelievable bungling.

On the other hand, I keep reading warnings that while all those fanatic Muslims may be a threat, the next Big One will be with China. Hmm, could that explain the sudden proliferation of Chinese restaurants all around the country? They're everywhere! Have you noticed that hardly any of the people working in them have bothered to learn English? Gee, I wonder why that is? Hey, wouldn't a restaurant be a wonderful place to cook up bioweapons? Who would notice an extra fifty-gallon tank over in the kitchen corner? Or drums of anthrax powder in the basement labeled MSG?

Oh, don't worry about me, I'm just a natural worry-wart.



# 73 Amateur Radio Today

- Plumber's Delight
- 2m/70cm Circle Quad
- 2m Twin Loop
- More VLF to HF Loop

# Twisted Tale of Dial

# Tube Truths: Dimming the Glow?

# Aland Islands OH0

0 11 7485 1 08725





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## QRX . . .

### The Return of "The Doctor is Destinated": Questions & Answers for the New Ham

Q. I've been reading through old QSTs to try to find

out exactly what an antenna tuner does, and I keep running into words like "impedance" that I just don't understand. Please explain!

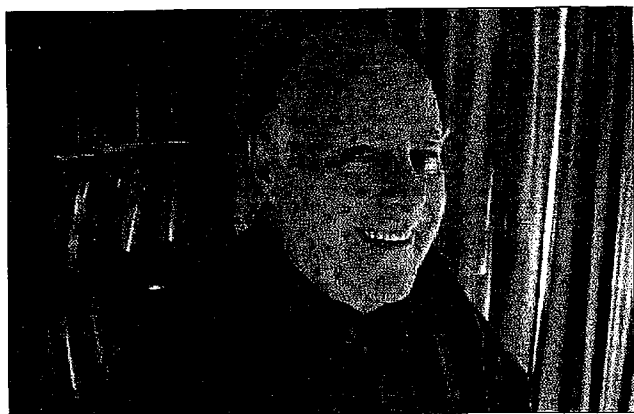
A. The people who write for QST seem to want to make everything more complicated than it is. But don't

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article (IBM (ok) or Mac (preferred) formats), carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

### NEVER SAY DIE

Wayne Green W2NSD/1

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#### Birthday

My 80th birthday is September 3rd. What would I like for my birthday? To help more people to enjoy life. Oh, how I wish you could be with me as I walk through my north pasture, counting the different kinds of wildflowers growing there. Billions of flowers. And next week it'll be all different! Our language is inadequate to express the feelings of joy these flowers inspire.

All my life I've been driven to share the things I enjoy the most with as many people as possible. The tremendous fun of ham teletype got me to start my first publication, back in 1951. The years of fun I had at the workbench building equipment got me to start this magazine. I wanted as many others as possible to experience the excitement and thrill of building things.

My editorial essays are my way of sharing my excitement in discovering new books and ideas with you. And sharing my frustration with things which we could make better.

My biggest frustration is in my not being able to share my joys with more readers. The fun and excitement that I've had with amateur radio — a 64-year love affair. The joy of music, which I was able to share through a magazine and my recording studio. The joy of new ideas. My excitement when I discovered that all illnesses are caused by our mistreating our bodies, and thus could be reversed just

by stopping the mistreatment. My excitement when I discovered the super scam of jobs and a college education.

Many readers have suggested that I do an autobiography. Sure, in ten volumes. But what for? I'm much more interested in the future than the past. I want to help us have a new generation of kids with average IQs of 150, who can speak with no accent and think in a dozen or more languages, who can read at over 10,000 words per minute with 100% comprehension, who will have visited dozens of countries, who will get rid of those crooks in Congress, and so on. All this is doable with what we already know — it's just a matter of getting the word out.

I'm excited over the potential for replacing our fossil fuel culture with one of cold fusion. And for being able to provide the finest education in the world to kids anywhere at a tiny fraction of our current school costs.

My main projects this last year have been the starting of *NH To Do* magazine ... aimed at getting more people to visit New Hampshire and enjoy the fantastic things we have to do. Joy sharing again. And getting the word out to stop people from making themselves sick. The joy of good health.

I love skiing like the wind down our mountains. I love our incredible fall colors. I love scuba diving the world's reefs. I love Joplin's ragtime music. And, most of all, I love hearing from people who have shared my loves and joys with me.

#### A Birthday Present

The best present you can give me for my birthday would be more readers. Do you know anyone with even a partially open mind who might enjoy reading 73? Anyone tired enough of being sick so they're open to something other than a doctor's treatment? Maybe a fellow ham who might like to get more fun from the hobby than endless formula contacts.

The regular subscription price is \$25 ... so tell you what, if you'll send me a gift subscription for someone as a present to me for my 80th birthday, just send me \$20 and their name, call and address. And do it before the end of September 2002, okay?

#### Crackpot

Yes, I admit I'm a crackpot. I don't believe in global warming. And neither would you if you read much beyond the newspaper headlines. I don't believe in treatments for sickness, I believe in prevention. I don't believe it's fair to future generations to leave them a world denuded of oil, coal, and natural gas when cold fusion offers unlimited energy at around a tenth of today's cost (and with no pollution). I don't believe NASA ever sent anyone to the Moon. And neither would you if you took even a day or two to look into the matter. I do believe that UFOs are real, as are the thousands of contactee reports, and that ETs have been here for millennia. And so on.

As I said above, I do believe we can raise a new generation with average IQs of 150, who can speak a dozen languages without any accent (and think in them), and who can read with comprehension at over 10,000 words per minute. A generation who will be better educated by the time they are twelve than 99% of today's college graduates. We can, but we won't.

The intellectually incurious consider me a crackpot for such beliefs.

Almost lost among the mountains of trivia and crapola are books written by the most brilliant of the world's minds. Few of these giants waste their time as professors trying to reach the almost totally sealed minds that end up in today's college classrooms. Their wisdom is available to anyone interested at a fraction of our school system's cost.

Will this new generation put up with a few trillionaire bankers and megabuck businesses controlling the government? Will they be driven by TV attack ads like sheep to the voting booths? Will they be interested in what passes today as entertainment? In listening to dysfunctional families screaming at each other on the TV court shows? In laugh-track-enhanced sitcoms? In screaming audience interview shows? Jeeze, I sure hope not.

Will our high-IQ, super-healthy, wised-up kids be satisfied to work from nine to five for 40 years so they can

*Continued on page 7*



*continued from page 1*

worry — just like the government, we're here to help you. Your radio station is just like a car, and what we need to describe here is the "drive train." Your transmitter is, of course, the engine. Power is generated by the transmitter (engine) and goes through the transmission (gearbox, or antenna tuner) to the drive shaft (feedline) to the wheels (antenna). Now think of impedance as "torque" and you have the whole picture. That was easy, wasn't it?

And just as with a car, you must have a license to "drive" your radio. You need to know about as much about radio to get a radio license as you do about driving to get a driver's license. So anyhow, whenever there is something about radio that you don't understand, just try to picture it as a car.

Q. At a recent hamfest, I purchased an oil-filled dummy load. How often do I need to change the oil, and what kind of oil should I be using?

A. Assuming that you are a QRP operator, peanut oil will do just fine. If you run QRO, though, we'd suggest filling your dummy load with gasoline. You should change the oil every 3,000 miles or three months, whichever comes first. Unless you do fill it with gasoline, in which case you will only need to do it once.

Q. I have an old Vibroplex, and two things perplex me. Why is there a picture of a cockroach on it? Also, I watch it constantly, but have never seen the little red LED on top light up.

A. The LED is to warn you when you start sending too fast. Usually you will see smoke rising up from the dot contacts at about the same time. So if you see the LED light up, you had better shut down instantly or you will risk permanent damage. The cockroach has long been a symbol of New York City, where your Vibroplex was made. Nowadays they are made in Atlanta GA, and the Dr. has heard that the logo will be changed to a Coke bottle soon.

Q. I have heard that old electronic components are very collectible, and I would like to start a collection. What should I start with?

A. Now is certainly a great time to start a collection of components, because lots and lots of them are available at reasonable prices, and one day they'll be worth serious dollars. For example, when the Dr. was a kid you could buy a Coke for a nickel, and now they cost a LOT more. The Dr. sure wishes he had stashed a few away. A good way to start a collection of electronic components is to go into your local Radio Hovel Store and buy a resistor. Buy the best one you can afford, and be careful to treat it well. DON'T clean it, and be sure to save the original packaging materials.

Later, you can go back to the Hovel and buy a bag of assorted resistors or other components. These are called "mixtures" and are specially designed to give collectors something to do. You will find many different varieties, and often very rare ones that nobody knows of a use for. Sort them by their colors, sizes, and shapes, and if you wish to display them be sure to use rosin core solder. You will also find a lot of interesting items (technically called gizmos) in your HT, and you can remove most of them for your collection without much impact on how useful your HT is.

Q. Everybody talks very respectfully about old-timers, so I was wondering: How can I get to be one?

A. Be patient.

Q. I'm left-handed. When I send Morse code, all the dits and dahs come out backwards. What should I do?

A. In the old days, your Elmer would have tied your left hand behind your back and made you send "I will send with my right hand" one hundred times. But this is the 21st century, and it is a very simple procedure to have your doctor surgically remove your left hand.

Q. The other night I wanted to make a DX Q-socket. I fired up my leenyar and shouted my call sign a couple times, but somebody told me I was splat-tering. Is that a good thing or a bad thing?

A. It's a bad thing. But it's simple to fix: Never eat soup when you are operating DX.

Q. Is it possible to impeach the president of an amateur radio club?

A. Only if the club is located in Santa Monica and has an intern program.

Is something bothering you? The doctor will wrack his brain in trying to help you guys. Just write to him in care of this publication, and don't forget your "free will offering."

*Thanks to Marshall Emm N1FN, who sends along the doc's answers via Low Down, newsletter of the Colorado QRP Club.*

## It's An Enigma No More

Germany's World War II top-secret Enigma spy machine was the message encoding device that gave Germany the ability to keep its military movements secret during much of the conflict. Now, it appears as if a British woman actually cracked a major component of the Enigma before World War II began, but her supervisors dismissed her theory as too simple.

British newspapers have printed excerpts from

the new publication titled *Action This Day*. The book claims that discoveries made by a female codebreaker known only as "Mrs. BB" that could have opened the secrets of the encoding machine much earlier and shortened the war.

In the late 1930s, the Enigma was dubbed the key to Germany's military communications system. Codebreakers including Alan Turing, the father of the modern computer, were trying in the late 1930s to break the Enigma cipher, but they could not work out how the keys of the Enigma machine were wired.

The book's editors, Michael Smith and Ralph Erskine, say that "Mrs. BB" suggested the Germans wired the A key to the A rotor, B to B and so on through the alphabet. This theory dismissed as too simplistic, was later proven to be correct.

The full Enigma code was finally cracked by a team of thousands of men and women, including chess masters, civil servants, and mathematics geniuses [and 73's long-time International Editor, the late Richard Phenix — ed.].

*Thanks to Bruce Tennant K6PZW, via Newsline, Bill Pasternak WA6ITF, editor.*

## The Ten Commandments of Electrical Safety

I Beware of the lightning that lurketh in an undischarged capacitor, lest it cause thee to bounce upon thy buttocks in a most embarrassing manner.

II Cause thou the switch that supplieth large quantities of juice to be opened and thusly tagged, that thy days may be long in this earthly vale of tears.

III Prove to thyself that all circuits that radiateth and upon which thou worketh are grounded and thusly tagged, lest they lift thee to a radio frequency potential and causeth thee to make like a radiator also.

IV Tarry thee not amongst those fools that engage in intentional shocks, for they are not long for this world and are surely unbelievers.

V Take care thou useth the proper method when thou takest the measures of high voltage circuits so that thou dost not incinerate both thee and thy test meter, for verily, though thou hast no stock number and can be easily surveyed, the test meter has one and as a consequence will bringeth much woe unto the supply officer.

VI Take care thou tamperest not with interlocks and safety devices, lest this incurreth the wrath of thy supervisor and bring the fury of the safety officer upon his head.

VII Work thou not on energized equipment for if thou doest so thy shipmates will surely be buying beers for thy widow and consoling her in certain ways not generally acceptable to thee.

VIII Verily, verily I say unto thee never service equipment alone, for electrical cooking is a



slow process and thou might sizzle in thine own fat upon a hot circuit for hours on end before thy Maker sees fit to end thy misery and drag thee into His fold.

**IX** Trifle thee not with radioactive tubes and like substances, lest thou commence to glow in the dark like a lightning bug and thy spouse be frustrated and have no further use for thee except for thy wages.

**X** Thou shalt not make unauthorized modifications to equipment, but causeth instead to be recorded all technical directives and authorized modifications made by thee, lest thy successor tear his hair and go slowly mad in his attempt to decide what manner of creature hath made a nest in the wiring of such equipment.

Thanks to Squelch Tale, newsletter of the Chicago FM Club, June 2000. **73**

## NEVER SAY DIE

continued from page 4

play golf? Or tour the country in an RV?

At a Rotary Club meeting recently I asked for a show of hands of how many had been to Paris. Six hands went up out of the 52 there. How about Berlin? Four hands. Afghanistan? None. India? One. Japan? Two. China? None. That's pathetic! And typical.

Sure, it takes money to be able to travel — though not as much as you probably think. Read my travel diaries and see. Herbert Hoover said, "If a man has not made a million dollars by the time he's 40, he hasn't worked much." Herb should have added, "worked *smart*."

How can the curious find the books which explain what's really going on? My *Secret Guide to Wisdom* reviews the key books and will help you find them, recruiting you into the crackpot ranks with me.

## Hey, What's Going On?

Okay, so you missed taping Steven Quayle on The Art Bell Show explaining about 19 of the world's top microbiologists being murdered in the last few months. These have all been scientists who had been working on biological warfare projects. None of their killers have been found.

You can get the gory details at [www.stevequayle.com].

Will the next war be fought with troops landing, with nuclear armed missiles, or with what we have been calling terrorism? Smuggling in small nukes to wipe out our major cities and spreading aerosolized ebola-smallpox via light planes to kill even more millions is an infinitely cheaper approach. And, unlike WWI, WWII, Korea, and Viet Nam, this

war would be waged right here in America. And, unless they brag about it, how'll we know which country we're fighting? Who can we nuke in return?

Which country would benefit by the elimination of the top microbiologists? Any country with a stockpile of stuff ready to dump on us. Like Iraq. Like Libya. Or Osama. And we know Saddam has several thousand Iraqi sleepers living around America. Like Saudi Arabia, which has been fanning the flames of religious hatred against us, and has

enough billions to get people to do anything it wants. Or China, with tens of thousands of Chinese living in every town in America.

So here we are with wide open borders, protected by fast asleep immigration border guards. We have an FBI that doesn't talk to itself, much less any other services. We're sitting ducks for this new kind of war — 250 million sitting ducks.

Continued on page 8

# RIGrunner

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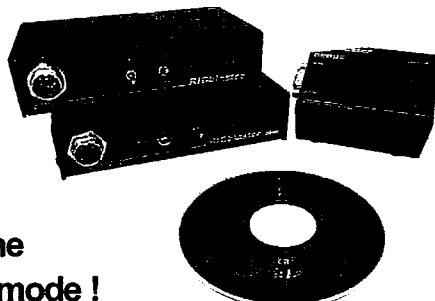
# RIGblaster

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## NEVER SAY DIE

continued from page 7

So, why kill the top scientists? That could go a long way toward stopping the development of biological countermeasures. That's what I'd do if I was planning a major biological attack.

### Tarfu

Tarfu? For you youngsters, that's snafu". Alas, it also describes our beloved government. An eight-page article in the June 3, 2002, issue of *The New Yorker* does their usual well-researched job of throwing light into dark corners. It almost exhausted my Magic Marker.

I've read about how the FBI not only doesn't like to share information with the CIA, NSA, INS, and other government agencies, but they don't even have a workable system for internally handling information.

Like? Well, we've read about Muslims taking flying lessons, right? And this raising some questions. Like the idiot who insisted on learning how to fly a 747, but didn't want to bother learning how to do take-offs and landings. Talk about waving a red flag!

Sure, an Algerian terrorist group hijacked an Air France airliner and threatened to crash it into the Eiffel Tower in 1994. A wake-up call for our ever-alert agencies? Zzzzzzzz. But then, if many Muslims started taking flying lessons, that would wake 'em up, right?

One of the 9/11 hijackers, Saeed Alghamdi, took his flying lessons at a Florida flight school. The school's records show that four men with that name were trained there. Worse, the school had trained more than 1,600 students with the first name Saeed and more than 200 with the surname Alghamdi.

Considering how few private aircraft there are these days and thus a huge undemand for flying lessons, was anyone even remotely awake at the school?

According to a former INS district director, the agency has issued thousands of visas for young Middle Easterners to enroll in flight-instruction programs. And where are these guys now? Anyone's guess.

Did they come here to learn to fly planes in Afghanistan, Saudi Arabia, and so on? Har-de-har. What planes? Are they now sleepers in America, awaiting the call to swoop down on private airports, grab some planes and douse us with anthrax, smallpox, or worse? Or dump poisons in our reservoirs?

As one expert was quoted, "More than half a dozen federal agencies are involved in airline travel, and their inability to

work with each other is notorious. Protecting their own turf is what matters."

So, are the FBI, NSA, CIA, INS and so on solving their problems? Will giving them bigger budgets to hire more people help? It never has before. There seems to be no real rush because "The American people are going back to sleep."

So, are we sitting ducks while Inspector Clouseau hires more assistants to help him shuffle papers? Meanwhile these alert agents are keeping themselves busy hassling grandmothers at airline gates and making me take off my shoes to check for explosives. Yep, me! And giving me a tiny bag of pretzels to eat instead of a meal during the flight.

I wonder how many men would be needed to take control of the Silver Ranch airport in Jaffrey NH, fuel up a couple private planes and dump a few hundred pounds of anthrax upwind of nearby Boston?

Presuming that the feds are no more organized to provide emergency communications when the fan gets hit than they are at keeping track of what apparently are thousands of infiltrated terrorists, I suggest that every ham club get busy and organize their members to be ready to step in and provide communications for the police, fire, hospitals, and all those federal bureaus. Or you can wait until something happens and try to wing it.

### Fighting Terrorism

Ya want peace? Well, you aren't going to get it by walking around waving PEACE placards. And you aren't going to get it with peace talks, either. If peace talks worked, the Middle East would by now be a world model for peace.

We Yankees won the Revolutionary war by outsmarting the British. Their generals were furious with us Yankees when we darted around, hiding cowardly behind trees, mowing down their rows of well-armed men.

I'm all for outsmarting our current enemies instead of trying to fight by their rules. An A-bomb on Mecca in retaliation for the next major terrorist outrage in America might make us feel good, but it would sure make a few hundred million Muslims even angrier at us.

So, what's my solution to the misery our government has gotten us into? How can we outsmart the enemy? Piece a cake. Let's use our mightiest weapon against them. No, not those lousy A- and H-bombs. We don't need to encourage nuclear retaliation. Our mightiest weapon — the one which won WWI and WWII for us, as well as the Cold War — is our ability to innovate and produce stuff in huge quantities. Democracy didn't win those wars, capitalism did.

### Learning From History

When I visited New Caledonia and talked with the local hams, I learned that when the French arrived they found that the local tribes had been at war with each other for hundreds of years. So they set up TV stations and started broadcasting. The natives had to stop fighting long enough to get jobs to make enough money to buy TV sets for their families. Then, they had to keep on working so they could buy the products being advertised on TV. And that was the end of tribal wars.

Say, whatever happened to Voice of America broadcasting? Is that still going, or did it fade away with the Cold War? Have we set up radio and TV stations in Afghanistan yet? Commercial stations? Are we broadcasting in the local languages? How about in India, Pakistan, and anywhere else where Muslim kids' almost only source of education is memorizing the Koran?

When I talked with the hams in Yugoslavia back in the '50s, I learned that the people there wanted cars so badly that they would spend a year or two's wages to get an old used one. Aha! Another incentive to get people to stop fighting and start working.

So, let's start designing the cheapest possible car we can — something like an advanced go-kart — and start setting up factories in underdeveloped countries to make 'em. That'll get 'em off their camels and donkeys, just as \$600 Volkswagens and Deux Cheveaux got the Germans and French off their bicycles fifty years ago.

But what about jobs? Millions of jobs for the people who want to buy a TV set or a cheap car?

No problem? When I first visited Singapore in 1959 the country had just pulled itself out of terrible poverty. When the British got out of Malaysia, Singapore was an awful mess. It was so bad that Malaysia wanted nothing to do with it, so Singapore was isolated and left on its own.

The new government called in a U.N. team to help. Since Singapore was essentially a 50 square mile island with no resources except a big bunch of very poor Chinese, the team did a survey of the raw materials within easy shipping distance, and then another of the potential nearby markets. They then went to Europe and got the money to build factories to fill the market needs. Up went high-rise apartment complexes to replace the tin hovels. Up went factories and out went the products. The result in record time was a miracle — an Asian Tiger.

Continued on page 62



# YOU Can Build This VLF to HF Loop Receiving Antenna

Part 2 of 3.

*Constructing the air core loops: The air core loops described violate one of the cardinal rules of good loop construction — the wire turns are bunched together, not separated by a quarter inch or more of air.*

This is the product of an intentional trade-off; I wanted a mechanically simple loop that could be constructed from inexpensive plumbing fixtures and that used standard enameled magnet wire. There are two main drawbacks to my construction technique, both of which are related to bunching the turns:

- The loops have a lot of distributed capacitance, which reduces the maximum frequency.

- The standard inductance formulas produce inaccurate results, so some cut-and-try will be necessary if you deviate from how I built my loops.

Feel free to experiment with different approaches. For example, I built a three-turn loop using the center conductor

from scrap RG-58A coaxial cable. The polyethylene insulation provides some turn-to-turn spacing and reduced distributed capacitance. An even better approach might be to use magnet wire inside plastic tubing. If you want to try a shielded loop, try copper plumbing pipe instead of PVC. Attach the shield to the sleeve, and remember to break the shield at the top center.

I built three air core loops covering 135 kHz through 7.2 MHz, as outlined in Table 2.

The air core loops are built from standard 3/4-inch PVC pipe and plumbing fixtures using the dimensions shown. If I were doing it over again, I would consider using 1/2-inch PVC pipe to reduce the weight.

If you wish to design for a different frequency range, you can use the formula for the inductance of a square loop provided in *The ARRL Antenna Book* as a starting point:

$$L(\mu H) = 0.008N^2s \{ \ln [1.4142sN/(N + 1)] + 0.37942 + [0.3333 (N + 1)/sN] \} \quad [2]$$

where:

L is the inductance in microhenries

N is the number of turns.

s is the length of side in cm

ℓ is the coil length in cm

Determining ℓ (coil length) when the wire is scramble-wound is difficult. Even with a good estimate of ℓ, my experience is that equation [2] overestimates the inductance of a scramble-wound loop by 25% to 30%.

The loop tuner has maximum and

Turns/Induct./C <sub>DIST</sub>	Range Setting	Min. Frequency	Max. Frequency	Comments
3T/9.3 μH/26 pF	High	1.95 MHz	7.2 MHz	10-in. leg; center cond. RG-58A wire
	Low	1.120 MHz	4.8 MHz	
10T/93 μH/50 pF	High	600 kHz	1800 kHz	11-in. leg; no. 20 AWG magnet wire
	Low	330 kHz	1300 kHz	
24T/536 μH/102 pF	High	240 kHz	580 kHz	11-in. leg; no. 20 AWG magnet wire
	Low	135 kHz	475 kHz	

Table 2. Air core loops.

Range Mode	Min. Capacitance	Max. Capacitance
High	33 pF	705 pF
Low	104 pF	2362 pF

Table 3. Loop tuner maximum and minimum capacitance values.



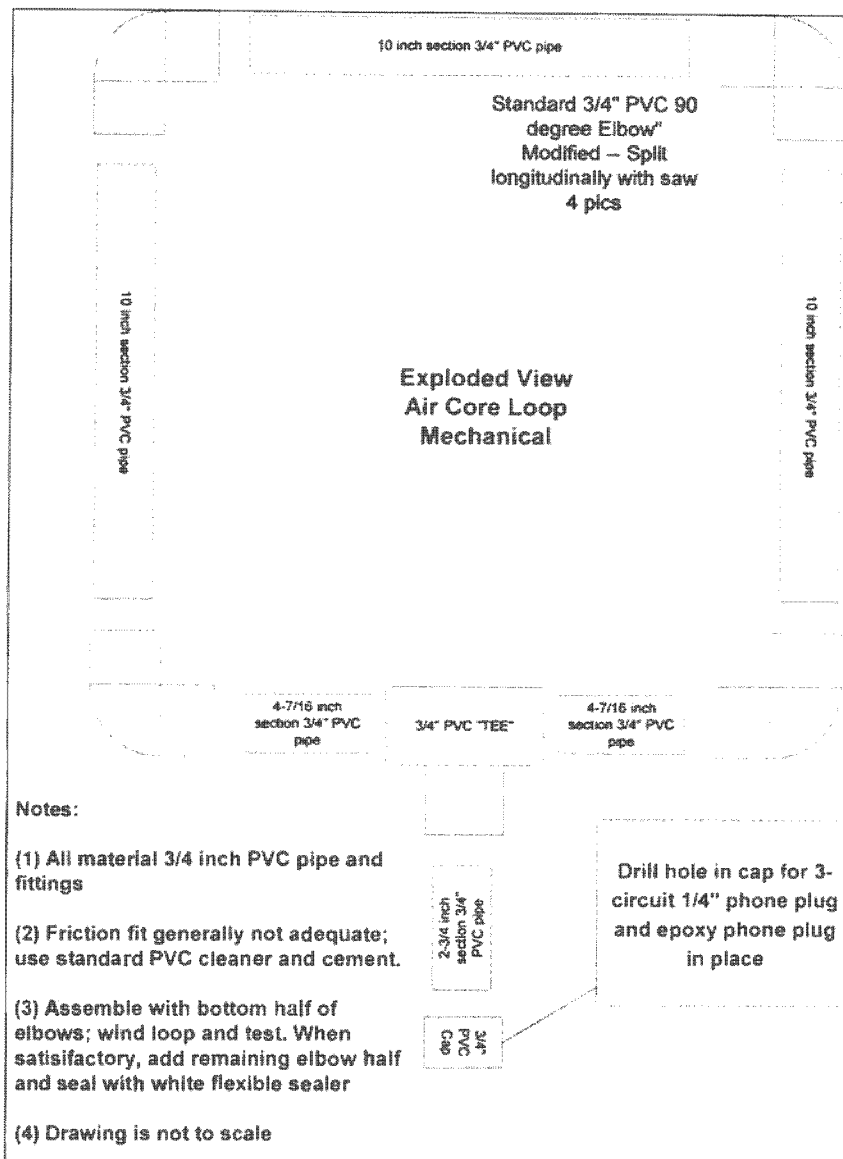


Fig. 8. Air core loop.

minimum capacitance values as shown in Table 3.

You can then use the calculated inductance and the appropriate capacitance to determine the tuning range using the familiar tuned circuit formula in Equation 3. Multiply dimensions in inches by 2.54 to convert to centimeters. Don't forget to add the estimated distributed capacitance of your loop to the values in the above table. I found distributed capacitance values ranging from 20 pF (3 turns) to 102 pF (24 turns).

$$f_{\text{MHz}} = \frac{159.16}{\sqrt{LC}} \quad [3]$$

where:

$f$  is the frequency in MHz

$L$  is the inductance in microhenries

$C$  is the capacitance in picofarads

Once you have selected the number of turns, you can use the following steps to build your loop:

1. Secure the material, and cut the PVC pipe sections to length. (The first two air core loops I built were about 1 inch longer per side than the dimensions shown. I found those to be too top-heavy.)

2. Cut the four 90-degree elbows longitudinally. I used a scroll saw, but a hacksaw should work. If you use a

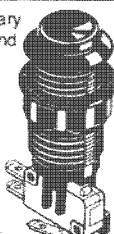
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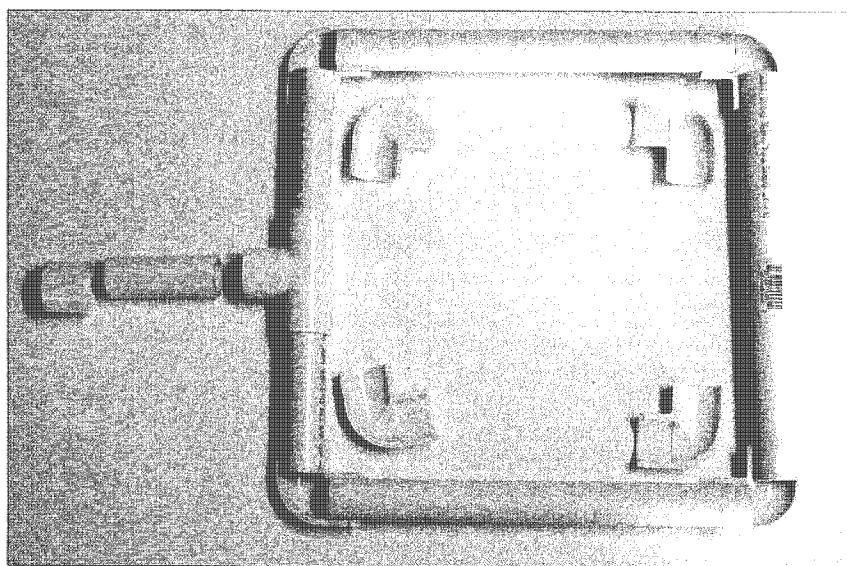


**Photo G.** Cutting the 90-degree elbows with a scroll saw, using a pusher tube.

power saw, observe proper safety precautions. I used a scrap piece of PVC pipe as a “pusher” to keep my fingers at a safe distance from the saw blade. I

No. Turns	Inductance & Rod Type	Wire Size	Turns per Inch	Range Setting	Min. Frequency	Max. Frequency		
60	183 $\mu$ H, Type 61 mat'l	#24 AWG	10	High	490 kHz	1650 kHz		
				Low	240 kHz	1120 kHz		
372 $\mu$ H, surplus broadcast-band loopstick				High	375 kHz	1250 kHz		
				Low	170 kHz	830 kHz		
537	20.2 mH, Type 33 mat'l	#34 AWG	82.6	High	46 kHz	150 kHz		
				Low	21 kHz	100 kHz		

**Table 4.** Ferrite core loops.



**Photo H.** Assembled air core loop, ready for winding.

also used a piece of scrap aluminum as a guide so that I could keep the cut straight. Label each elbow 1–4 before cutting, and each side A or B. Cut consistently so that the elbows are fed into the saw in the same direction and with the same side (“A” or “B”) always against the guide. This trick helps when it comes to assembling the loop, as it reduces the effect of misaligned cuts.

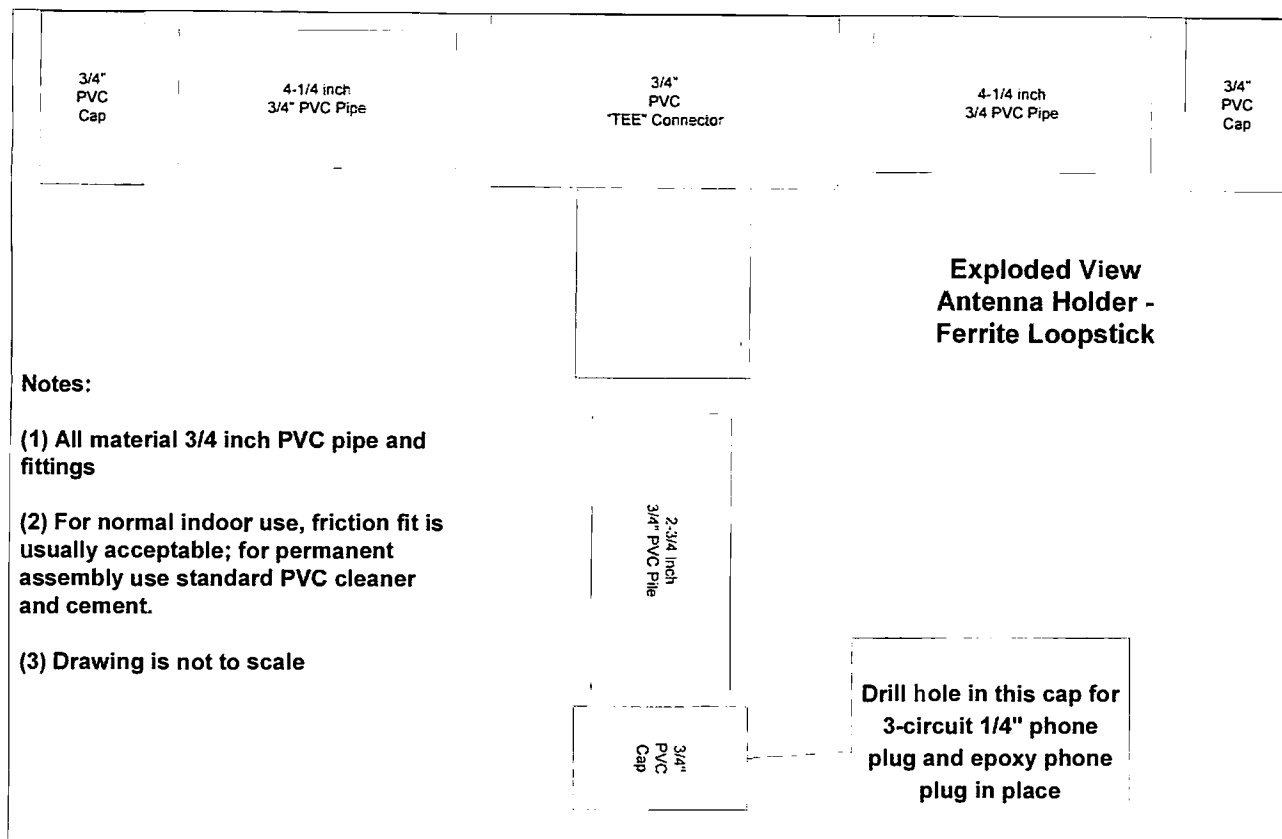
3. Drill a clearance hole in the pipe cap for your 3-circuit phone plug. I used Radio Shack part number 274-139A plugs that required a 7/16-inch drill. There seems to be some variation in shell size, however, so check the size required before drilling. Epoxy the 3-circuit plug in place and allow the epoxy to cure. Since the plug mechanically supports the loop, make sure the plug is centered in the pipe cap and is straight.

4. Assemble your loop using the split elbows. Use a consistent set of elbow halves, such as 1A, 2A, 3A, and 4A. I’ve successfully used standard PVC pipe cement, super glue, and epoxy for assembly. Do *not* attach 2-3/4 inch stub or the pipe cap with the 3-circuit plug at this time. At this point, your loop should look like the photo and will be ready for winding.

5. Calculate how much wire you will need, figuring 4 feet per turn plus an extra two feet, and cut it from the reel. Feed one end of wire through the center leg of the “T” and wind the loop. The photo shows how each corner will look. (The illustration shows the 3-turn loop that I wound with RG-58A center conductor.) I found winding the 10- and 24-turn loops easier when I worked outside and stretched the wire out along my driveway. Wind the desired number of turns plus an extra two or three turns.

6. When finished winding, you should have the two wire ends sticking out the center leg of the TEE. Cut off any excess wire, strip and tin the ends, and solder to the *tip* and *ring* pins of the 3-circuit plug. (Polarity isn’t important.) Leave the sleeve (ground) pin unconnected. Temporarily assemble (without glue) the 2-3/4-inch stub and the cap. Install the loop on the tuner and check the tuning range. Since you





**Notes:**

(1) All material 3/4 inch PVC pipe and fittings

(2) For normal indoor use, friction fit is usually acceptable; for permanent assembly use standard PVC cleaner and cement.

(3) Drawing is not to scale

**Fig. 9. Ferrite loop.**

have extra turns, the tuning range should be below the target range. Remove a turn at a time until you hit the desired tuning range. Of course, it may not be possible for you to precisely hit a target range, since you can only have an integral number of turns.

7. When you are satisfied with the tuning range, glue the 2-3/4-inch stub in place as well as the cap with the 3-circuit plug. Match up the four elbow halves and glue IB to 1A, etc. Clamp the halves together with spring clamps or heavy weights while the glue sets. If you have cut the elbows with a thin saw blade, you may decide the kerfs are unobjectionable. If the gap is large, you can fill it in with white flexible caulk. You should not use caulk that gives off acidic vapor when curing, as it may corrode the loop windings. If you object to the blue pipe labels printed on PVC pipe, spray paint the completed loop with white paint when completed, masking, of course, the 3-circuit plug. If you have constructed more than one loop, label each loop with its frequency range.

**Constructing ferrite core loops**

As outlined in **Table 4**, I built three ferrite core loops covering 21 kHz through 1650 kHz. Above this range, I prefer an air core loop.

Since you are unlikely to find a surplus loopstick that matches mine, I'll concentrate on making a custom loopstick antenna using either mix 61 or 33 cores.

My designs are based on a 7-1/2-in.-

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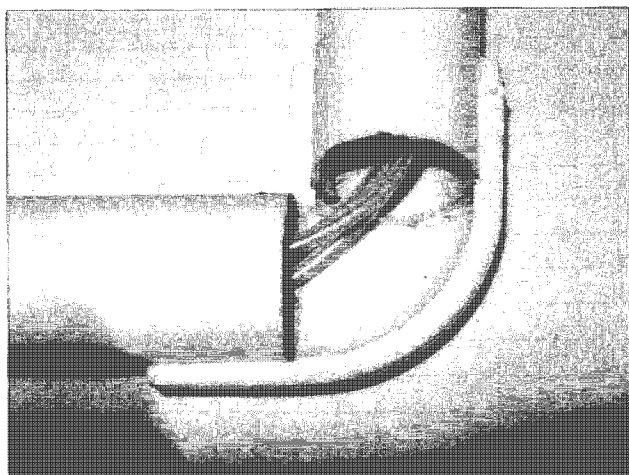
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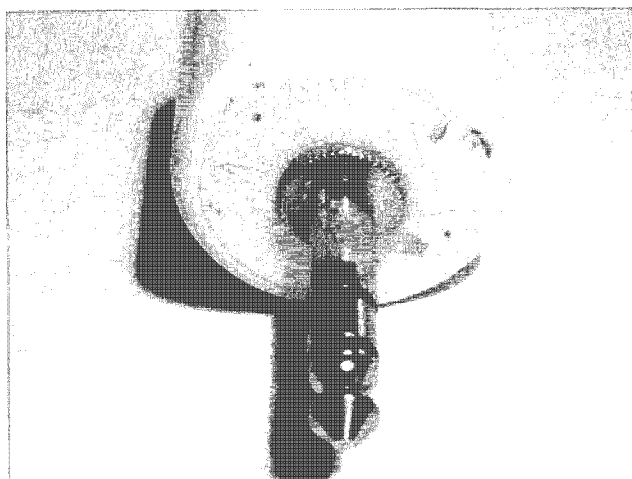
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**Photo I.** 90-degree elbow with turn loop.



**Photo J.** 3-circuit phone plug mounted in pipe cap.

long. 1/2-in.-diameter ferrite rod. These rods are available in two formulations: "mix 33" and "mix 61." At the risk of significant oversimplification, use mix 33 for frequencies below 500 kHz and mix 61 for everything else.

I spent two months building and analyzing more than 50 different ferrite loop antennas. Rather than attempt to explain how to design and optimize a ferrite loop, I'll instead concentrate on explaining how to duplicate the ones I built. If you wish to depart from these precooked designs, the best readily available reference is Chapter 5 of *The ARRL Antenna Book* (1994). However, in building test antennas I found that the information published in the amateur literature greatly oversimplifies many factors and that differences of 50% between theoretical and measured parameters were common — so be prepared to do some experimenting!

1. Secure the material, and cut the PVC pipe sections to length.

2. Drill a clearance hole in the pipe cap for your 3-circuit phone plug. I used Radio Shack part number 274-139A plugs that required a 7/16-inch drill. There seems to be some variation in shell size, however, so check the size required before drilling. Epoxy the 3-circuit plug in place and allow the epoxy to cure. Since the plug mechanically supports the loop, make sure the plug is centered in the pipe cap and is straight.

3. Wind the coil following a few pointers:

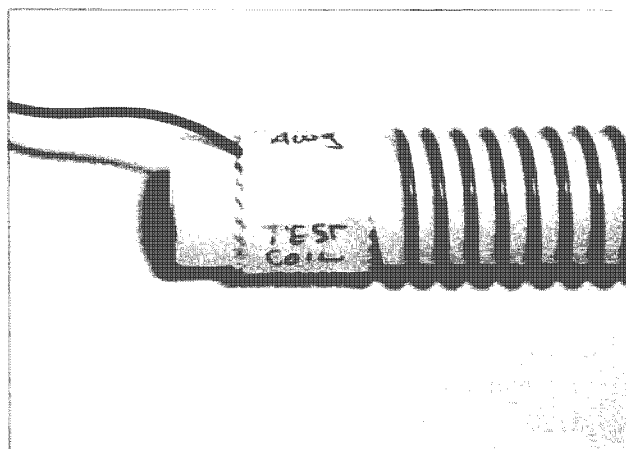
- a. Don't wind directly onto the ferrite rod. Instead make a paper core. Wind two layers of typing paper around the rod and glue the paper into a cylinder using glue suitable for paper. The rod should be a snug fit into the paper cylinder, but it should be

possible to slide the rod in and out. The paper cylinder should be the same length as the rod.

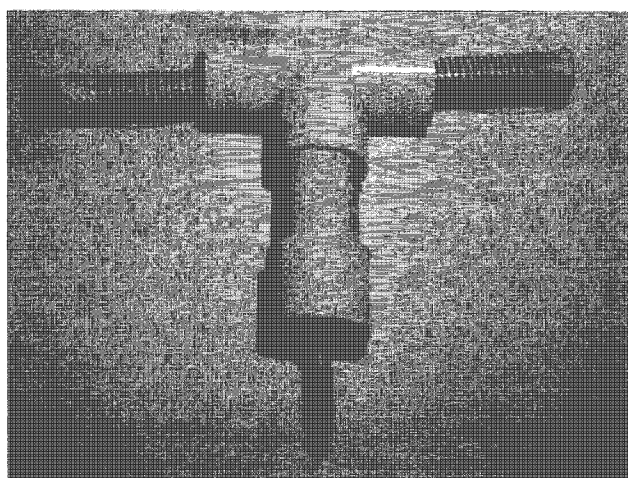
- b. Calculate the winding length; for example, 60 turns at 10 turns/inch means the winding length will be 6 inches. Mark the paper core with the start and finish as well as making a mark every half-inch.

- c. Wind the coil, striving for as much uniformity as possible. Leave a foot or so of wire at the start and end of the windings. To avoid collapsing the paper core, insert the ferrite rod. Please treat the ferrite rod with care, as it is brittle and will fracture if stressed. (I used a mandrel made from a steel rod and wound my coils on a lathe, inserting the ferrite only when the coil was ready for testing.)

- d. It is necessary to apply tension to the wire while winding, and while finished, it is necessary to restrain the



**Photo K.** Coil for ferrite rod showing paper core and ends anchored with adhesive tape.



**Photo L.** Ferrite coil antenna with ends removed.





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winding. I taped the start and finish windings to the core with 1/2-inch adhesive tape.

4. Press-fit the 2-3/4-inch stub into the center of the TEE. Insert the coil into the TEE section, routing both free wire ends through 2-3/4-inch stub. Cut off any excess wire, strip and tin the ends, and solder to the *tip* and *ring* pins of the 3-circuit plug. (Polarity isn't important.) Leave the sleeve (ground) pin unconnected. Temporarily assemble (*without glue*) the 2-3/4-inch stub and the cap. Install the loop on the tuner and check the tuning range.

5. If the tuning range doesn't match expectations, adjust the loop:

a. Squeeze the turns together or stretch the turns farther apart. Squeezing the turns together increases inductance (lowers frequency) while stretching reduces inductance (increases frequency).

b. Slide the ferrite rod away from center position. This will reduce the inductance.

If you can't achieve your desired tuning range, then rewind the loop.

6. When you have achieved your target tuning range, unsolder the loop and remove it from the TEE. Cement the winding to the paper core with Q-Dope® glue. If you don't have Q-Dope, household cement may work. When the glue is dry, reassemble the loop, including the PVC legs, and resolder to the 3-circuit plug. To prevent the loop from rattling inside the pipe, fill the TEE with packing. I've used plastic "peanuts" and scraps of foam rubber successfully. Fill the legs and then slip the caps over the end. I've found that friction fit holds the assembly together without the need for cement. If you wish additional mechanical strength, cement the assembly together, but

*Continued on page 58*

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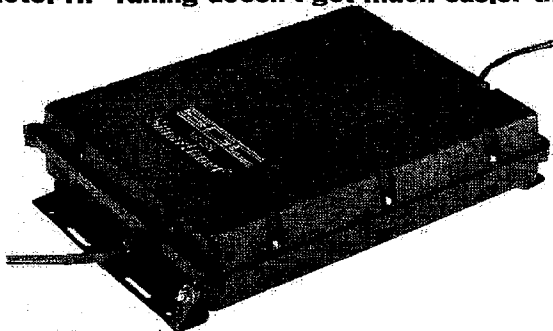
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# Vacuum Tubes: Romance and Reality

*A (mostly) glowing tale.*

*Hams of all ages have long had a love affair with vacuum tubes. Arguably, the 1950s were the golden years for amateur use of vacuum tubes. However, hams who remember those years probably have only a vague understanding of the vacuum tube's origin and history. Also, the demanding nature of vacuum tubes has long been forgotten, while the memory of their beautiful glow lingers on.*

**T**he early 1900s marked the first "solid state" era for radio communications, with the emphasis on the word "solid." It was an age of spark transmitters, crystal detectors, and other physically solid devices. It was an unlikely setting for the birth of the fragile, glass bottle vacuum tube.

In those early years, radio communications utilized sparks. To understand a spark transmitter, think about the small spark you create when you walk across a carpet on a dry, cold, winter day and touch a doorknob. If you were carrying a portable AM radio, you would hear the static generated by that spark. That's how spark transmitters worked, only they used much larger sparks, requiring a significant amount of electricity.

An important need in the 1900s was for a better detector (receiver) of spark signals. To try to meet this need, John Ambrose Fleming, an English scientist, began experimenting with the "Edison effect" that had been noted in electric, glass light bulbs.

The Edison effect was named for Thomas A. Edison, the American inventor of the electric light bulb. In the late 1800s, Edison was troubled by the fact that the glass in his light bulbs

would eventually become darkened. This was caused by particles of the carbon from the light bulb filament being transferred to the glass. In investigating this problem, Edison placed another element (a plate) inside the bulb and discovered that a very small electrical current flowed from the filament through the vacuum to the plate. This action came to be called the "Edison effect" and seemed to be of no practical value.

To investigate the Edison effect, Fleming built his own two-element vacuum tube. In the course of his research work, he discovered that his tube could be used as a detector (receiver) of radio waves. Fleming called his two-element vacuum tube a valve.

## **Lee De Forest**

At about the same time, Lee De Forest, an American inventor, was also trying to develop a better detector of spark signals. He invented a flame detector that had two platinum electrodes held close together in the flame of a Bunsen burner. As strange as it sounds, it actually worked.

De Forest knew that, for practical reasons, the flame needed to be inside

a glass mantel. He also realized that the flame could be replaced with a burning filament. He ultimately created a vacuum tube that he called an audion. It was similar to Fleming's valve, but De Forest got there via a different intellectual path, or so he said. Actually, De Forest was quite familiar with Fleming's work with vacuum tubes. However, it was De Forest's decision to add a third element — called a grid — to his audion that produced the start of the vacuum tube revolution.

Nevertheless, for the first few years after its creation, the three-element audion vacuum tube languished. Even its creator was unclear about how it worked and could be best utilized. Then, in the 1910s, engineers like Howard Armstrong and corporations like AT&T began to turn the vacuum tube into a truly useful device.

Through their efforts, the vacuum tube became more than a mere detector of radio waves. It also became an amplifier, and even more importantly, it became an oscillator that could generate continuous waves, which would eventually replace spark transmissions. The development of new electrical circuits had turned the vacuum tube into an all-purpose electronic device.



During the 1910s, there was some limited use of vacuum tubes by hams. It was limited because at that point in time vacuum tubes were very expensive, their quality was poor, and their life was short. However, hams could clearly see their potential.

During the 1920s, vacuum tubes continued to be refined and developed. More grids were added to increase their performance capabilities. The power handling of transmitting tubes continued to increase. It was clear that vacuum tubes were here to stay.

The creation of radio broadcasting, in the 1920s, greatly expanded the demand for vacuum tubes. This meant that the volume production of tubes could create economies of scale and reduce the cost of tubes.

During the 1920s, ham use of vacuum tubes greatly expanded because of their lower cost and greater availability. Vacuum tube receivers and continuous wave tube transmitters were increasingly common; spark was no longer king.

During the 1930s, vacuum tube development continued. However, the great depression of the 1930s impacted ham use of vacuum tubes. In that era, it was not unheard of for a ham to have a one-tube receiver and a one-tube transmitter but have only one vacuum tube. This required physically moving the tube between the receiver and transmitter. Hams learned to make the best of what they could afford.

During World War II, hams went off the air, but vacuum tube development continued at an accelerated pace. New tubes were invented to work on the very high frequencies (VHF), miniature tubes for military applications were created, and tubes with a much lower current drain were developed. All of these vacuum tubes would greatly benefit the civilian market after the war had ended.

### The golden years

For most hams, the 1950s brought the return of relative economic prosperity. They could now afford more complex, multiple-tube transmitters and receivers, and they wanted them.

In that era, many hams were able to

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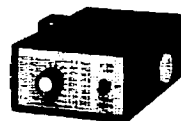
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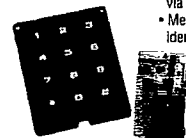
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afford commercially built multiple-tube receivers. However, building your own transmitter was still very popular. Some hams would even construct their homebuilt transmitter with a glass window that allowed viewing the final amplifier tube or tubes. Those glowing transmitting tubes were indeed a beautiful sight, and they could also warm up a ham shack on a cold winter's night.

In addition, a high-power, high-frequency transmitter would usually have mercury vapor rectifier tubes in the power supply. Those tubes gave off a beautiful blue glow that changed in intensity when you talked into the microphone during amplitude modulation (AM) phone operations. Also,

the audio quality from a glass tube modulator was fantastic; even today, audiophiles still prefer glass tube audio equipment.

Unfortunately, there was a downside to all those beautiful, glowing vacuum tubes.

A typical 300-watt, AM, high-frequency transmitter would need a power supply capable of supplying approximately 1,500 volts. That power supply would require a large expensive power transformer, the associated filter choke, and rectifier tubes.

In addition, that transmitter would require a 150-watt class B plate modulator for AM phone operations. That modulator needed a large, expensive, 150-watt modulation transformer. It also required its own power supply, which would have a large, expensive power transformer, filter choke, and rectifier tubes. Finally, there were the filament transformers to light all those vacuum tubes in the modulator and transmitter.

Many hams of that era also built lower-power transmitters for mobile operations. However, even a 50-watt vacuum tube mobile transmitter presented some interesting challenges, because of the unique demands of vacuum tubes.

## Eisenhower era

The 1950s was an era of six-volt automobile batteries and generators — not today's alternators. Building a mobile transmitter that used vacuum tubes with six-volt filaments solved the problem of lighting the tubes. However, supplying the typical 450 volts needed for the tubes' plates was a challenge.

Hams used a dynamotor or vibrator to supply the plate voltage. A dynamotor was a motor generator that used the six volts to make it rotate and generate the 450 volts for the vacuum tubes' plates. A vibrator "chopped up" the six volts into a square-wave AC that a transformer could step up to a higher voltage. Both devices placed a tremendous strain on an automobile's electrical system. It was not unusual to see a car's headlights dim when you turned the transmitter on.

Even though a typical transmitter might have a number of vacuum tubes, they often became a rather minor part of the project. However, there was some concern over the cost of vacuum tubes. Fortunately, in the 1950s, vacuum tubes were being produced in large quantities for television sets. This resulted in economies of scale that helped to reduce the cost of these tubes, many of which were suitable for use by hams. In addition, military surplus tubes were widely available at a greatly reduced price.


Military surplus tubes could be obtained via mail order ads in magazines like *QST*. They could also be purchased at the surplus parts stores located in major cities like Chicago and New York. While the supply lasted, those tubes were a real bargain.

Even the famous Heathkit Company was not above using military surplus tubes in its kits. You knew the tubes were military surplus because of the markings on them and the box they came in. However, no one cared; they were new and unused, and the price was right.

In the 1950s, most drug stores had a tube checker. They were used by individuals to check tubes from home television sets. Hams also used them to check tubes used in their receivers and some of the tubes used in their transmitters. Obviously, tube checkers would not check high-power transmitter tubes, mercury vapor rectifier tubes, etc.

The most common problem with vacuum tubes was that — just like light bulbs — the filament would eventually burn out. However, tubes could also become "gassy" and fail to perform up to standard. Tubes were mounted in sockets, because they often had to be replaced.

The creation of the transistor spelled the end of the vacuum tube era. Today's solid state era has given us very electrically efficient ham equipment. Yet, the popularity of the old vacuum tube equipment still lives on. Even though we know solid state devices are more efficient, the romance of vacuum tubes tugs at the strings of our hearts.



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
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# 2 m/70 cm Quad Revisited — Part 1

*Try out this new, improved update to a CQ article.*

*The July 1999 issue of CQ Magazine covered my original 2 m/70 cm quad project. This was my first attempt to build a dual-band quad antenna. Some shortcomings were present, including a bit of overconstruction, but who knew what the wind, cold, ice, and other elements were going to do to it. I know a lot more today!*

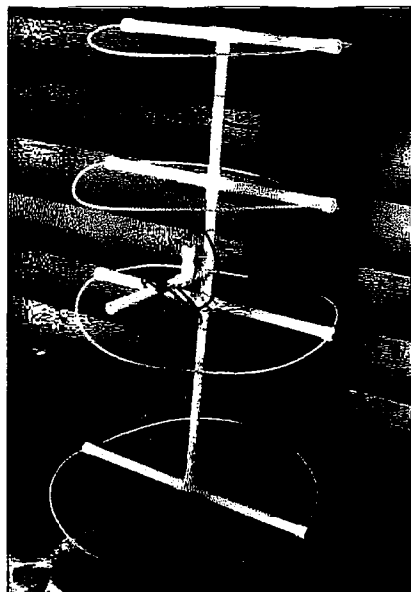
**T**his new design using 3/4-inch PVC water pipe shows a little bit better performance and is much lighter in weight. In this version, I used AWG-12 bare copper wire fed through 1/4-inch agricultural PVA tubing. This looks better and the performance is better on 440 MHz. My use of a ferrite choke also enhanced the

performance considerably: about 13 dBd over a dipole for under \$20 (U.S.). The boom length is about 4 to 5 ft., and an old TV rotor does the rotating.

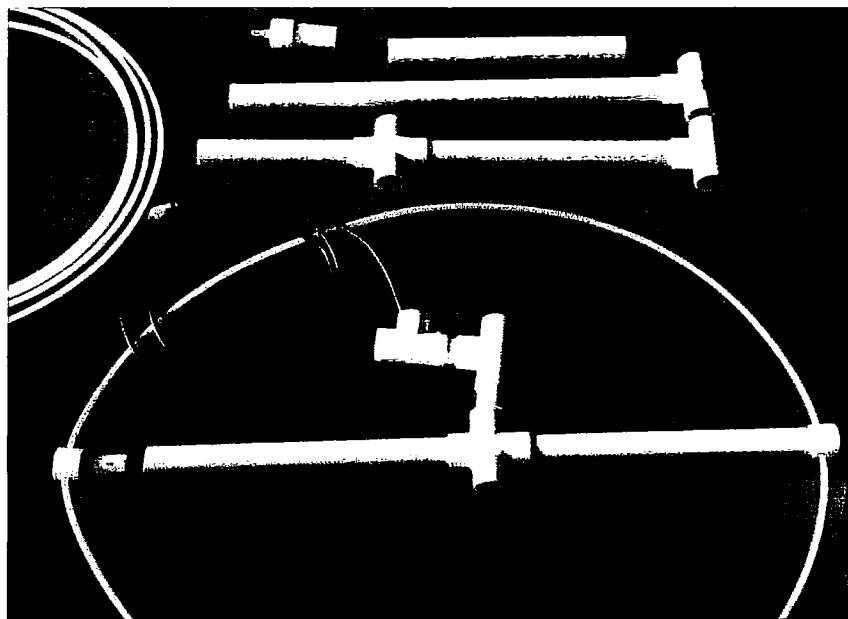
Part 2 of this article will explain the TV rotor part of the project.

Take a look at **Fig. 1** for the basic dimensions and layout of this PVC wonder. This modern-day “Plumber’s

Delight” is perfect for the 2 m/70 cm bands and in particular for satellite work. The system radiates both two-meter and 70-centimeter frequencies on the same elements with a boom length of under four feet (114 cm). The measured gain figures are about 11 dB over a dipole on two meters and 13 dB over a dipole on 70 cm. The additional



**Photo A.** Quad antenna without wood dowel stiffeners.



**Photo B.** Element parts and pieces.



2M/70CM 4-ELEMENT CIRCLE QUAD  
COMPONENT LAYOUT (NOT TO SCALE)

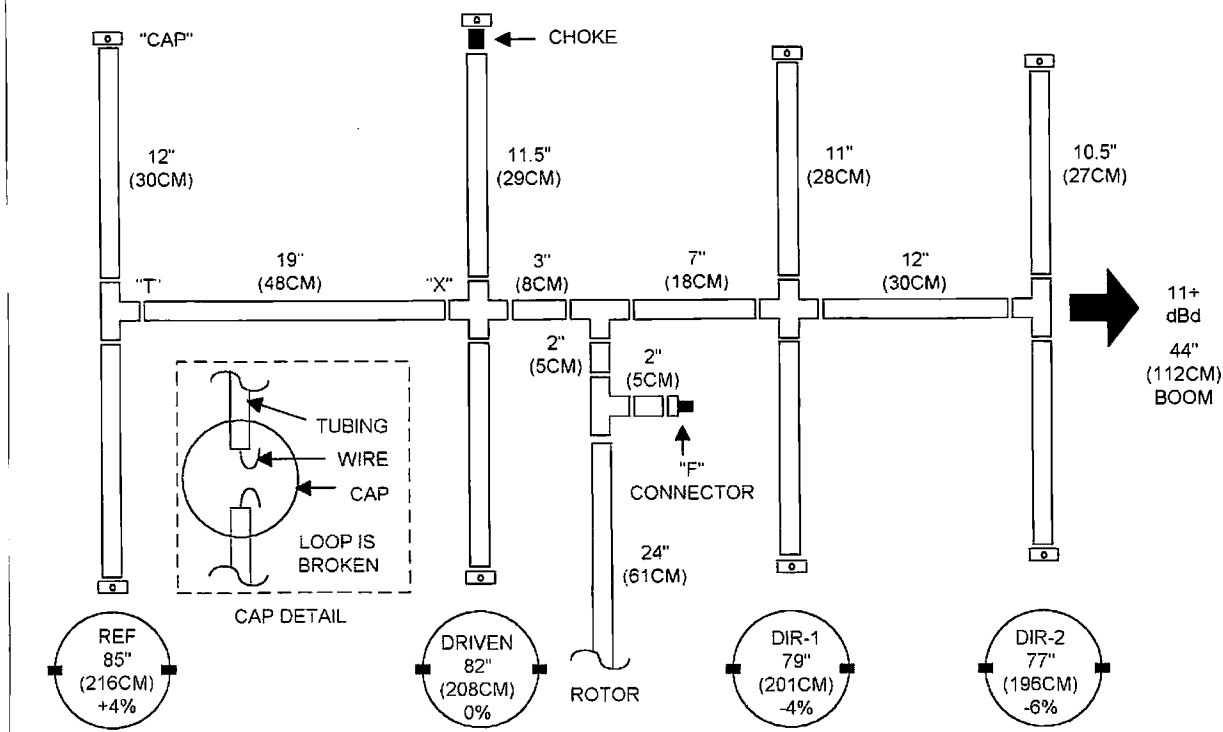


Fig. 1. Component layout for the 2 m/70 cm 4-element circle quad.

gain on 70 cm is due to the three wavelength elements. This is known as an "XL" element — that is, two or more wavelengths of the frequency being radiated. The noise figure, some times referred to as noise floor, is measured at about 3 dB below that of a four-element yagi. Some might consider that as gain also. The feedpoint is about 70 ohms, so a high-grade 75-ohm coax such as RG-6 can be used up to about 200 watts. The low-cost "F" connectors were also attractive at twenty-five cents each. There is no soldering involved since the center solid conductor makes the connection and the braid and foil shields are aluminum and cannot be soldered. After the connections are made, use black plastic PVC tape to weatherproof the connectors.

In regard to the gain figures, you will find Fig. 2 is a circular plot of measured gains under actual conditions. The gain figure and pattern was obtained from a Kenwood TS-780S transceiver's "S"-meter and a magnetic compass. The repeater used was at 145 MHz and located about 50 miles away.

The repeater is a 10-watt unit with an antenna system located on top of a 275-ft. tower.

Well, now let us look at how to put the thing together. The actual construction is very easy. The PVC water pipe can be cut with nearly any sharp object. A table saw is excellent, although a standard wood cutting saw or hack saw will also do the job. Round off the sharp edges prior to assembly to maximize the joint strength.

The end caps are drilled with a 0.125" drill bit to start pilot holes. Then follow up with a sharp 0.25" drill bit to finish the job. The PVA agriculture tubing is really a metric size, approximately 0.25" in diameter, and provides a very tight fit into a 0.25" hole. I use a little of the clear 100% silicone caulk on the outside just to be sure there is a good seal.

Just to make sure you understand: We are feeding on the side — that is, at the 90-degree point of the circle — so that the array is vertically polarized. Some testing has shown that a horizontal feedpoint at 180 degrees is acceptable

also without any apparent difference in repeater work.

The circle element does some things very different from the square or triangle loops. The gamma and balun transformer matching devices were tried without success. When applying twenty watts of RF using these matching devices, the loop could be tuned to a 1:1 SWR without a problem. But, when receiving was tried, the signal strength was affected very negatively. The direct connection of the coax to the driven element proved to give the best results on both receive and transmit situations. If you make any of the parasitic loops, reflector, and directors a closed continuous loop you can expect to see degradation of the antenna system performance. The open loop results in a higher Q element than the low-Q continuous loop, which translates to more gain. The noise figure does not increase, since the small break provides a little bit of coupling capacitance and therefore aids in getting a high-Q circuit. This principle was used in the 1950s on the 6- and 2-



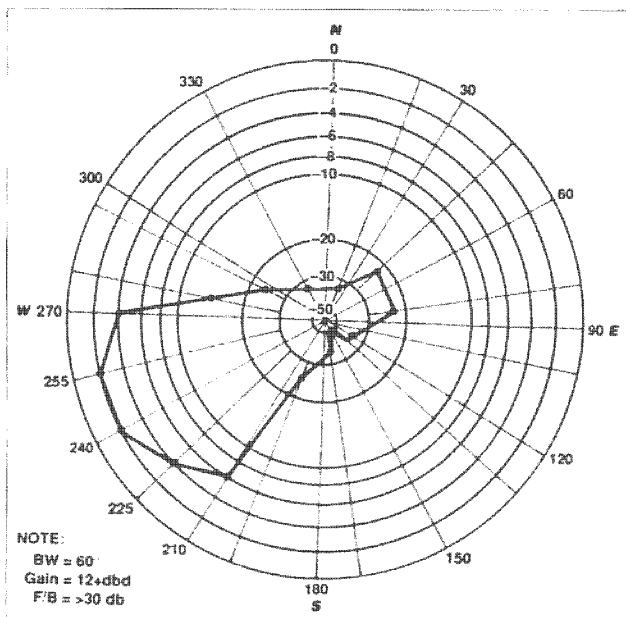


Fig. 2(a). The RF plot for the 4-element circular quad.

meter "Halo" loop mobile antennas. These were horizontal-mounted driven-element-only types which did very well for mobile installations.

No special tools or large efforts are needed to get this quality system. The element dimensions are not critical for good performance. The cost of materials amounts to about \$15.00 (U.S.). The stainless steel #4 sheet metal screws can be used to lock the PVC joints together, or you may use PVC glue. Either method has proven to be reliable. The PVC pipe and fittings are so tight that air and water leakage just does not seem to happen. The bandwidth is about what HF quads display and is in the area of  $\pm 2\%$ . This is without tuning the antenna to the rig. At 145 MHz, this is about  $\pm 3$  MHz, and at 435 MHz,  $\pm 9$  MHz. Because there is always a

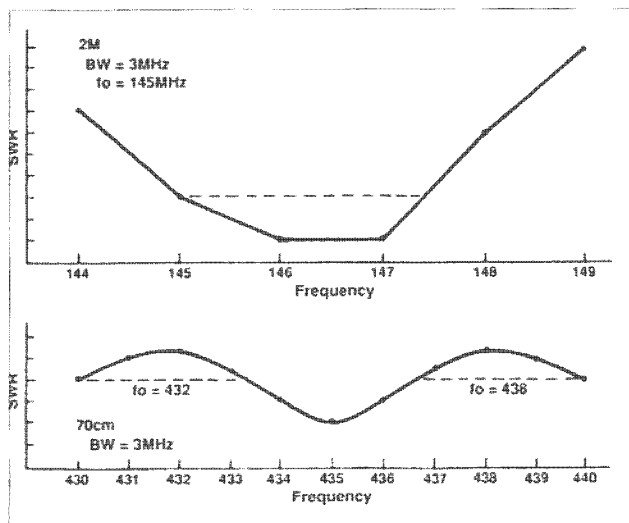
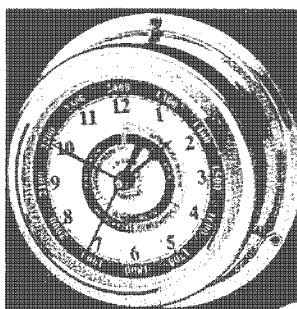


Fig. 2(b). The plot for SWR versus frequency, showing the usable bandwidth.



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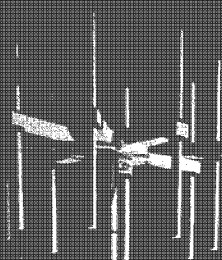
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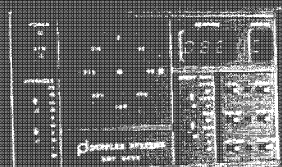


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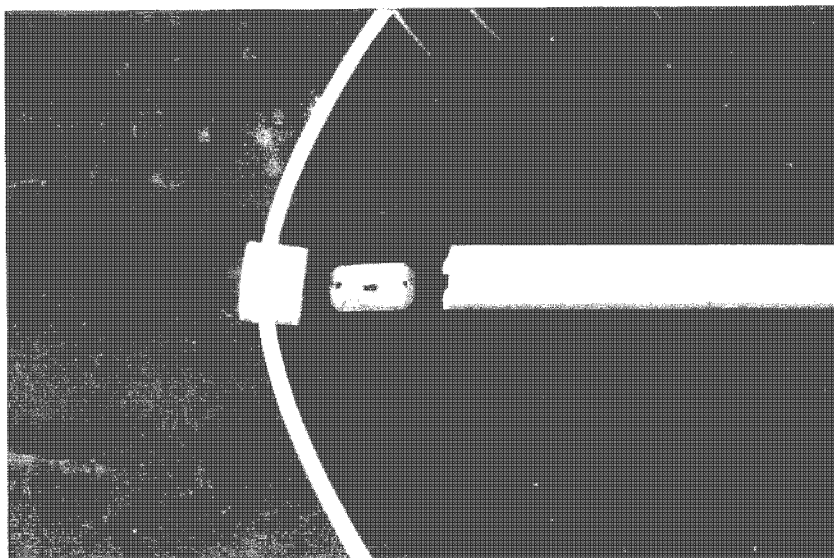
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*Photo C. Close-up of ferrite RF choke assembly.*

mismatch between the antenna and rig in the VHF/UHF spectrum, primarily due to transmission line length, etc., an antenna tuner is very helpful. It is a good idea to cut the feedline to about 7-ft. multiples, which is any odd number of electrical one-half wavelengths. It just makes matching much easier.

Just a helpful note to those who are interested: A dual-band 2 m/70 cm antenna tuner, RF switch, SWR/PWR, DC power filter project will be coming out soon as a "Weekend Project." Most VHF/UHF satellite-capable rigs have separate outputs for the two bands. So

a tuner for each output for antenna matching is almost always necessary. If 52-ohm feedline is used, make sure you use a one-quarter wavelength 2 m-75  $\Omega$  matching section of coax to change 52-ohm coax to 75 ohms, which the antenna-driven element is looking for. Remember that the name of the game at 2 m/70 cm is efficiency. You must get the RF power to the antenna!

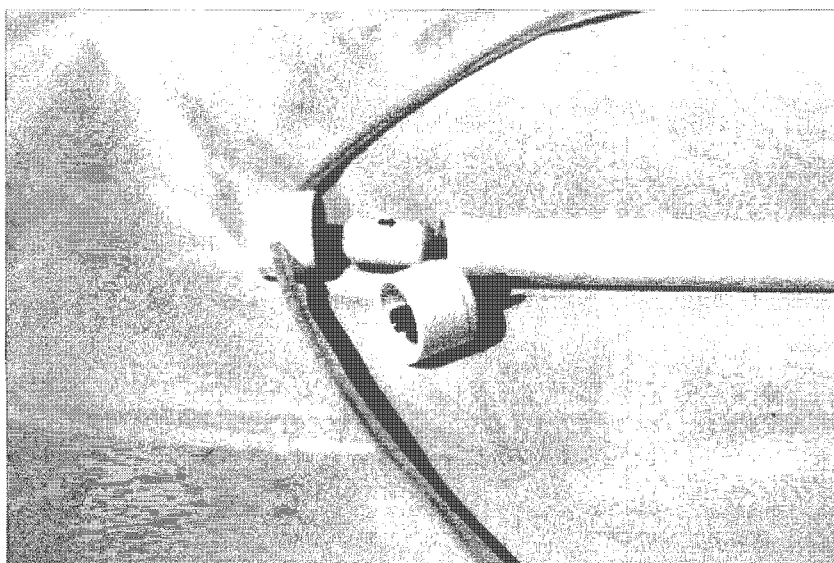
Now let us get back to the antenna system. The antenna has been through 60+ MPH winds without any problem. Because it is so light and strong, even an occasional icing does not seem to

bother it. The UV and heat buildup of the sun does not degrade any of my schedule-40 (white) PVC projects. The use of schedule-80 (gray) PVC is also acceptable if you prefer to pay extra for the materials.

I keep the length of the feedline to a minimum at my station. Every one knows the line loss of RF power at 430 MHz is bad. The RG-6 is about as good a coax as any, but keep in mind that the SWR = 1:1 200-watt continuous RF is the limit. If the SWR is not 1:1 then RF voltage will build up on the coax feed line thus again limiting the power handling capability. The trade-off on this type of cable is the breakdown due to high voltage building up when the SWR is up or power is over 200 watts. If additional elements beyond the four are contemplated, I would suggest that no real advantage was seen. If yagi one-half wavelength elements are placed as additional directors the noise would come up higher than the yagi director gains. Not a good idea! The advantage of a good quad antenna system is LOW NOISE with large bandwidth! This really comes into play on VHF/UHF bands.

In regard to the spreaders, I found that only two were needed to provide the loop support. If you are not happy with that or you live in an extreme weather area, you might want to consider extra top and bottom loop supports. I am including a very simple and inexpensive solution for that. I am including them in the article to show how it could be done, although I know they are not needed unless you expect heavy ice and wind.

73



*Photo D. Driven element RF choke assembly and "F" connector coax fittings.*

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# Twisted Tale: The Dial File

*Ever wonder how dials evolved? Well, read this anyway.*

*Being scientifically oriented, hams have always needed a way to measure the way things are adjusted. Dials have evolved as a result.*

**H**ave you considered the use, application, and design of “dials” as used on radio equipment from the very early days? When you stop to think about it, dials are the communication interface between humans and electronic devices. Dial markings and numbered reference points provide feedback to the operator of how the equipment is set up and/or adjusted.

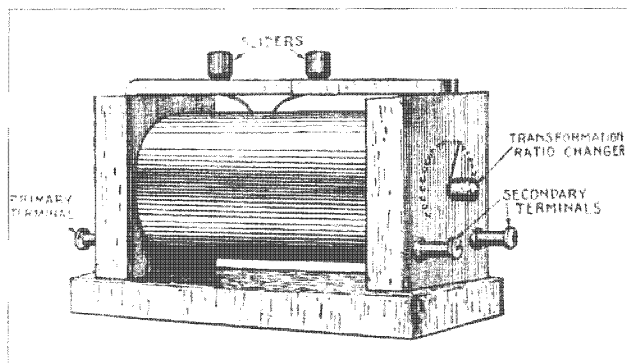
Because of the importance of dials to ham radio and many other forms of electronic equipment, I’d like to take you on a journey of “dials” as they’ve

been used over the many generations of radio as we know it today. I’ve managed to collect a few pictures of dials dating back to 1918. Because of the numerous dial designs and iterations, I’ve collected only a few that are representative of the many types that have been developed.

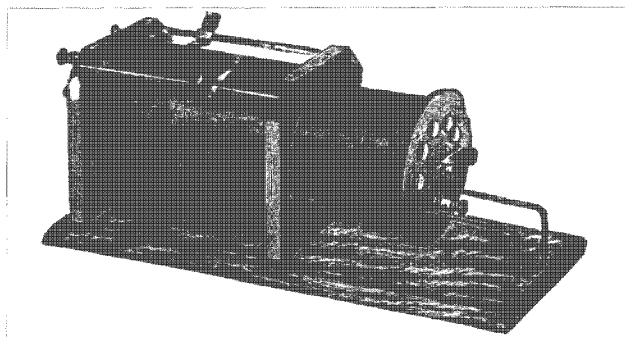
The first dials used were really step switches that allowed the equipment operator to have control over the selection of circuit parameters. **Photo A** is a drawing of an early step switch RF transformer. As shown, the switch changes the transformation ratio between the

primary and secondary windings. Since variable capacitors and resonance were still in the stage of infancy, step switches were used to change taps on RF coils used as transformers to meet the desired received signal peak.

Another variation of the step switch transformer arrangement is shown in **Photo B**. In addition to allowing control of the transformation ratio, coupling between the primary and secondary windings could be changed by sliding taps on the top of the coil assembly. The slider was placed on a coil allowing manual selection of the

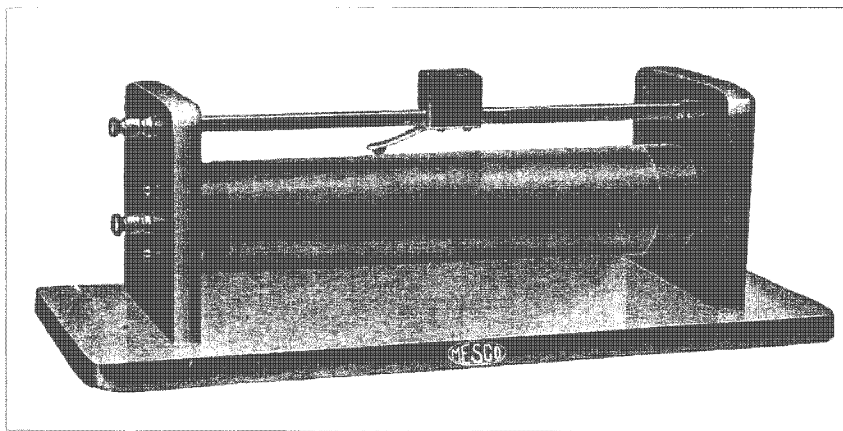


**Photo A.** Drawing of an RF transformer. A tap switch and sliders are used to select a desired turns ratio between primary and secondary windings. (Photo ref. 1, pg. 2322)

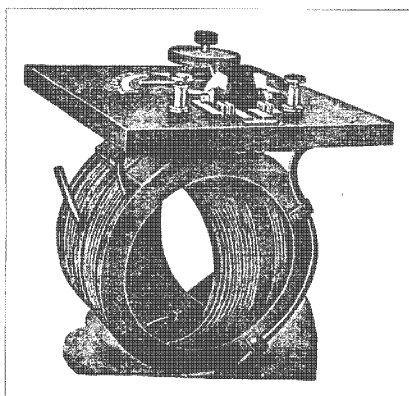


**Photo B.** This is an RF transformer exhibiting the typical tap switch and slider adjustments. In addition, one winding is capable of sliding along a set of rails providing control over the coupling factor. (Photo ref. 1, pg. 2310)





**Photo C.** This is a single RF inductor having a single slider. (Photo ref. 1, pg. 2308)

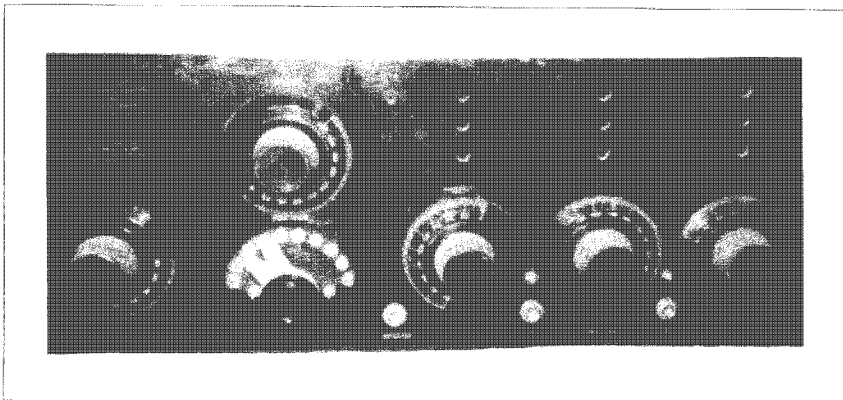


**Photo D.** This is a variometer. One winding is allowed to rotate within another. A tap switch is provided to change/control the turns ratio. (Photo ref. 2, pg. 80)

turns ratio, which was an advantage over the tap switch design. When this arrangement was used, the coil was placed in front of the operator so that he could "see" how the selections were physically placed for future reference.

In later models, the position of the adjustment was marked with numbers representing the number of turns for each selection. In some applications a linear scale was placed alongside of the slider to indicate the percentage of variability.

When I was a kid, I had a coil with a slider very similar to the one shown in **Photo C**. I used the coil along with a galena crystal and a longwire antenna to create a crystal set. What a pleasure it was to listen to local radio broadcast stations with my simple receiver. As for being able to change stations with the circuit, well, that was a different matter for a long time. Eventually I learned more about impedance matching, and that did enable the simple crystal set to become more frequency selective. Again, the coil assembly was mounted directly in front of me so that the slider position/selection was obvious by inspection.



**Photo E.** Note the use of the large round Bakelite dials. Use of this dial-type remained prominent from about 1935 through 1950.

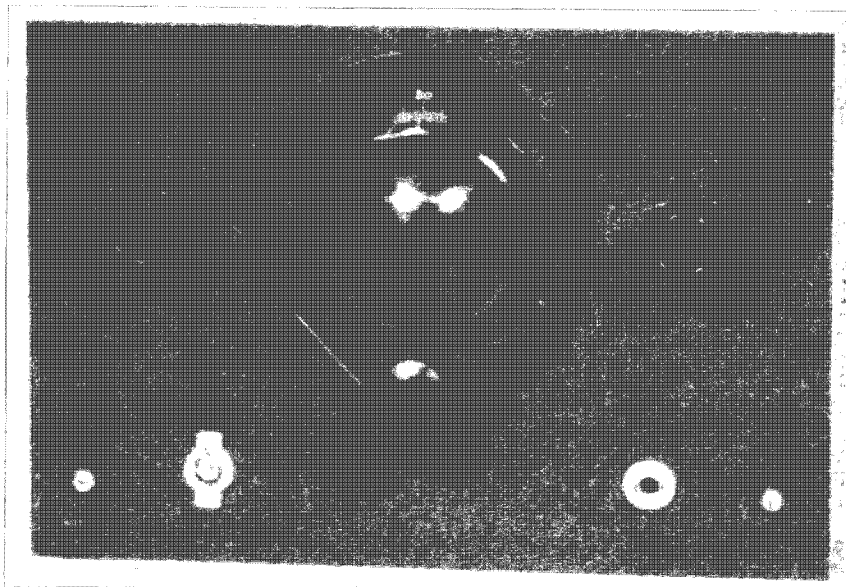
One of my favorite devices was the variometer as shown in **Photo D**. In a variometer, one coil was mounted internal to another and allowed to rotate around an axis. Rotating the coil changed the amount of coupling between windings. If the windings were connected in series, then the amount of inductance could be varied as desired. A reference dial was mounted on the top of the variometer shown in the photo to indicate the angle of rotation.

During the 1917-1918 era, "dials" began to emerge as the means for logging control settings. Of course, the addition of a control panel in front of the coils increased the "need" to have circuit selections made visible to the operator via a dial. Some of the early dial markings were related to the number of turns selected on the RF transformers. Then as resonance of RF circuits advanced, variable capacitors moved from a "Vernier" adjustment to a device requiring a selectable setting. With that advent, the dial markings became increments of 100 to coincide with 0-100%. An example is shown in **Photo E**, where a combination of dials was used on the equipment.

Take note of the shape of the knobs/dials as shown in the photo and compare it to the shape of the knobs and dials that became very popular with hams during the 1930-1940 era. The knob and dial were integrated into one unit. The knobs came in various sizes and were made of Bakelite. Dial markings were customized per the user's request; however, the common marking was 0-100. Yes, the numbering was reversed on some dials when a reverse rotation was desired. The important thing to observe regarding the large dial was that small incremental divisions allowed the equipment operator to have a rather precise logging value for an adjustment. In addition, the physically large knob profile gave the operator finer (Vernier) control of an adjustment.

Another one of my favorite dials was the type shown in **Photo F**. A small knob was used to drive a larger calibrated wheel providing a Vernier adjustment for "fine tuning" of a circuit. I built quite a number of VHF and





**Photo F.** This dial was one of the first Vernier adjustment-type dials. It was very popular with hams because of its professional appearance. (Photo ref. 3, pg. 132)

UHF receiver projects using this type of dial arrangement. I don't recall the name of the manufacturer of this dial, but wish that I did so that I could indicate that information here.

Another dial that was built on the same order is shown in **Photo G**. One of the advantages of this dial assembly was that it was easier to use/mount. The large dial had a nut that was used to tighten a collar around the mating

shaft. In this version, the tension nut was on the front of the dial where it was accessible, as compared to the previous dial that had to be mounted to the shaft before the cover and Vernier knob could be mounted.

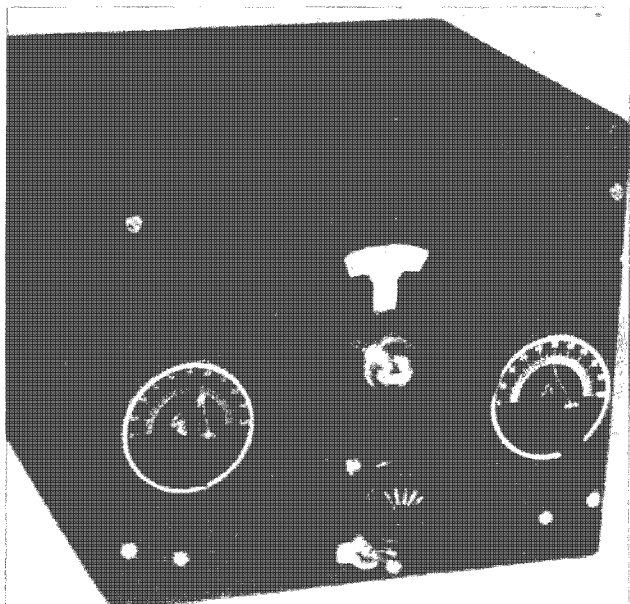
Dial markings for both Vernier assemblies came with various options. Some markings were simply 0-100 allowing rotation in one direction. Later dials were modified to allow rotation

in either direction. The markings were 100-0-100, with the "0" and "100" markings placed 180 degrees apart.

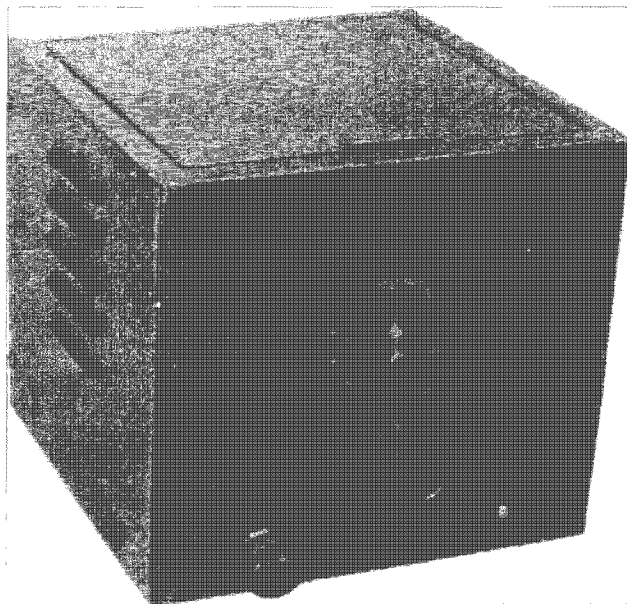
As dial design evolved, dial cord became a popular method of connecting the knob shaft to the dial assembly. An alternate method was the use of a rubber drive belt. An early dial cord design is shown in **Photo H**, where a large round dial is driven by a small knob. In this design, a large drive wheel constructed like a pulley had a pointer attached to show the dial position. A dial cord was wrapped around the large wheel and the small knob shaft creating a large adjustment ratio between the two shafts. By changing the knob shaft diameter to pulley diameter ratio, the degree of Vernier adjustment could be controlled.

With the use of dial cord increasing during this period, the shape of dials began to vary. One example appeared on the National NC-45 receiver as shown in **Photo I**. One of the user appealing dials of the period was the "slide-rule dial." The use of the slide-rule dial allowed the manufacturer to display many frequency bands and to provide a fine-tuning adjustment as a function of the pulley size ratio.

While looking at the National dials, I'd like to call your attention to the

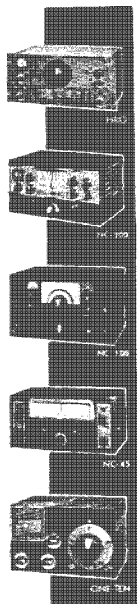


**Photo G.** Another design of a Vernier dial. The silver cap in the center of the dial covered the tension nut used to lock the main dial to a shaft. (Photo ref. 3, pg. 141)



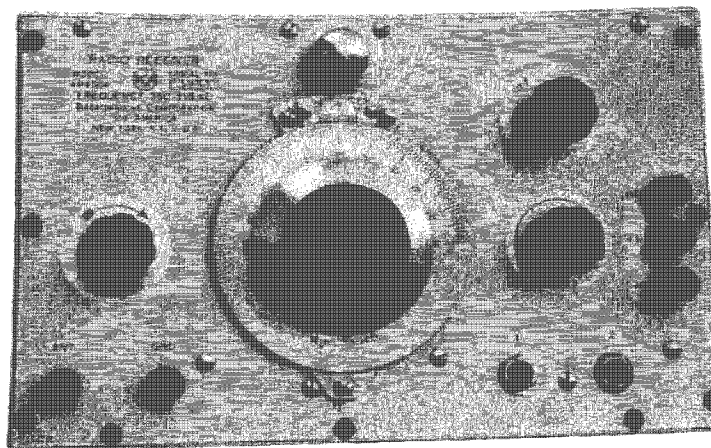
**Photo H.** This picture shows one of the early uses of a dial cord-driven dial. Some commercial radios of this era used a flat rubber drive belt instead of dial cord. (Photo ref. 3, pg. 150)





**Photo I.** National receivers had great appeal to hams because of the dials provided. Each had a professional appearance and function. One of the most popular was the dial shown on the lower receiver.

HRO dial assembly developed by National. It appears on the panel of the lower receiver. A set of planetary gears/wheels driving an inner dial was mounted behind the main dial face allowing dial numbers to change in the small exposed top window as the main dial was rotated. The small incremental



**Photo J.** This is a National Velvet Vernier dial. The planetary drive and incremental dial division accuracy made this a very sought after prize.

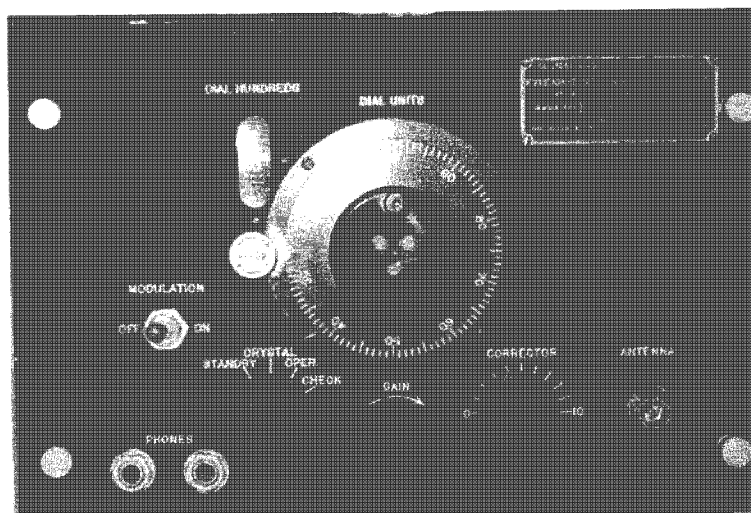
changes gave the user the feeling of extreme band spread control over the receiver's tuning.

World War II brought to our attention many new dial designs. Each, of course, was tailored to meet a rather specific function. A National Velvet dial was used on the receiver shown in **Photo J**. Take note how tuning accuracy and setting repeatability has increased over dials used on equipment prior to the war. The Velvet Vernier dial was divided into 100 linear increments and used a small scale immediately above the main dial allowing each major dial

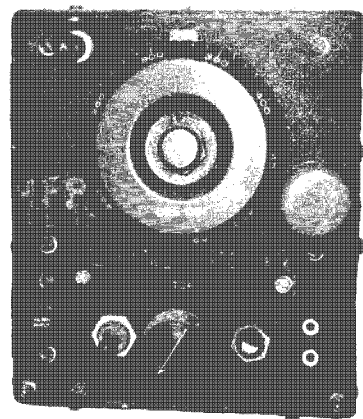
increment to be further divided into ten parts.

Following the war, hams searched the surplus market for Velvet Vernier dial assemblies. These assemblies were prized items for use on VFOs and the like. Because of the all-metal design, the dial was very rugged and was designed to last for a very long period of time.

Another dial design that came out of the War effort was one like that shown in **Photo K**. The major application was for use on frequency meters such as the Navy's LM series and the Army/AF BC-221. Because of the frequency measurement application, dial setting

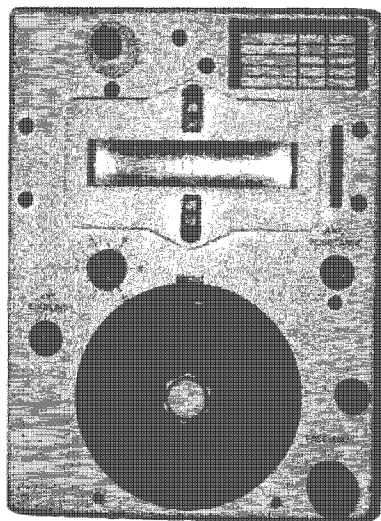


**Photo K.** Frequency meter dials provided the greatest accuracy and setting repeatability of any dial during the 1940-1950 era.



**Photo L.** This is a typical dial type used on the ARC-5 series of receivers. Note the wide spacing between calibration marks.





**Photo M.** An ARC-5 transmitter dial. Note the finer calibration increments as compared to the companion receiver dial.

accuracy was extremely important both for a specific setting and for setting repeatability. This dial used a spiral gear driving a split anti-backlash gear attached to a variable capacitor. Although there was very little backlash in the dial assembly, the entire dial drive train exhibited a small amount that required compensation during use. To compensate after calibration, the user would always rotate the dial in one direction as the desired frequency was approached.

Because the military frequency meters provided frequency stability and tuning accuracy, many hams converted the units for VFO applications. Even

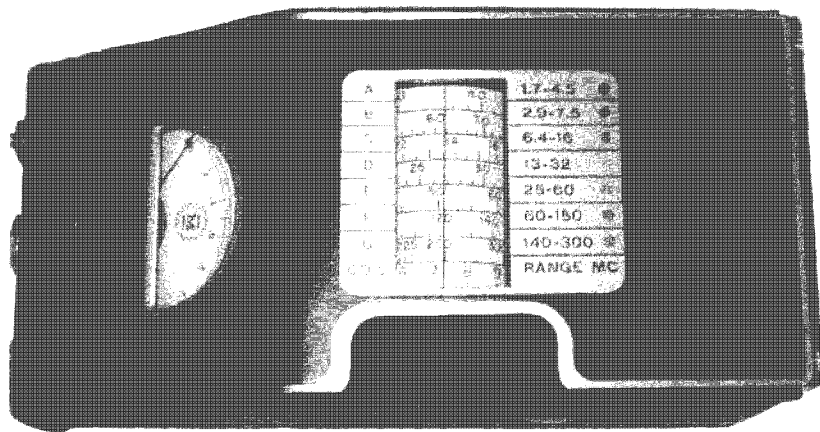
though digital signal sources being developed today may surpass the capability of the older frequency meter, the older frequency meter continues to have a place in the ham shack as a signal source and for verifying a signal frequency. Because of their usefulness, frequency meters continue to show up at ham swap meets.

Most hams have had the opportunity of working with the ARC-5 series receivers and transmitters that were used primarily in World War II aircraft.

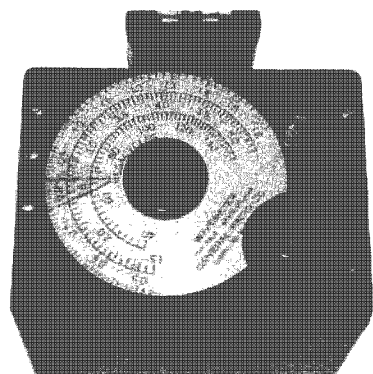
**Photo L** shows the typical receiver dial for the series. Note the rather wide spacing of the increments on the receiver. The receiver was normally placed in a remote location away from the user and the dial was not readily visible during use/tuning. The user dial was mounted on a remote control head many feet away from the receiver. In use, the receiver dial was used during equipment setup and remote dial alignment where incremental accuracy

at the receiver was not really needed.

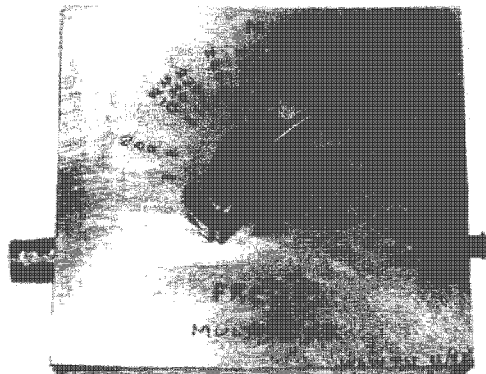
However, the transmitter dial was a different story. As shown in **Photo M**, the dial increments are better defined and divided to provide a more accurate frequency setting. In use, the transmitter was typically set to a desired frequency prior to a mission even though it could be reset while in flight. Part of the reason for the more accurate dial increment was to translate the internal calibration crystal to a specific dial setting. One of the interesting features of the transmitter was the green "magic eye" that would wink when the transmitter's oscillator came into zero-beat with the internal crystal. Once the oscillator was adjusted to a zero-beat,



**Photo N.** A drum-style dial used on a Millen grid-dip meter. Markings on the dial wrap around nearly 360 degrees of the drum.

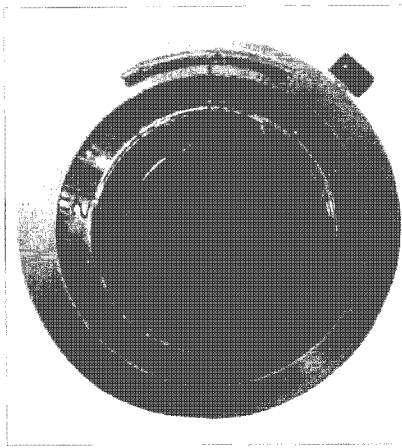


**Photo O.** A flat friction-driven dial as was used on a General Radio wavemeter.



**Photo P.** A dial hand-drawn onto a panel face. The pointer knob is attached directly to a capacitor's shaft.





**Photo Q.** This is a multiturn dial designed to be used with a 10-turn potentiometer.

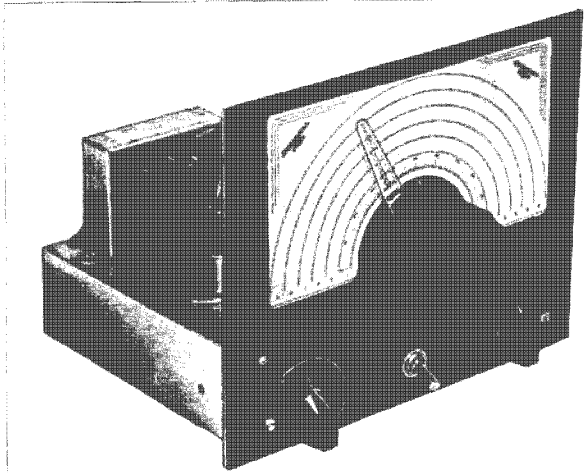
the dial would provide reasonable accuracy in setting a frequency within the tuning range.

Numerous ham projects evolved from the ARC-5 series. Receivers were modified for both mobile and portable operations. The higher-frequency series of the ARC-5 receiver were converted to operate on the 10- and 6-meter bands. The lowest-frequency receivers were used to "listen" to the IF signals of other ham receivers. This process provided multiple conversion capability that narrowed the received signal bandwidth. Because of the oscillator stability exhibited by the transmitter, hams utilized them in both VFO and stand-alone transmitter applications.

Another form of dial that deviated from the norm was the drum dial. An example is shown in **Photo N** that was used on the Millen grid-dip meter. Drum dials enabled the use of one dial to accommodate multiple frequency bands. Driving the dial with gears allowed the dial increments to be separated sufficiently to accommodate a band spread around 360 degrees of drum rotation.

Drum dials were used on some ham radio equipment as well as on test equipment. Because of the multiple bands drawn on the dial, keeping one's eye on a dial track, or finding the correct track at a glance, became a user issue. Some equipment suppliers added a small moving pointer to the assembly that moved with the track selection, allowing one's eye to quickly identify the selected band.

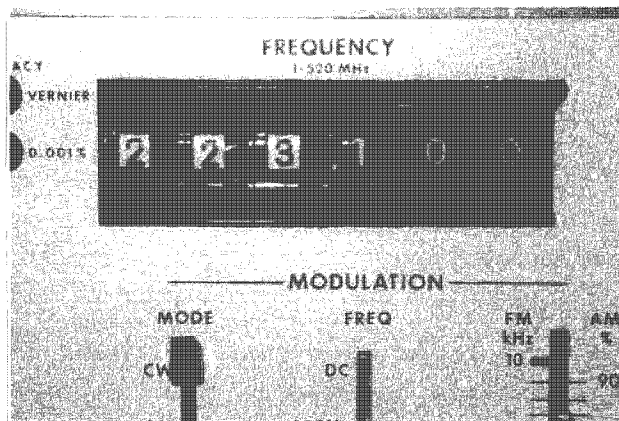
Simple externally mounted dials were and are still quite popular for some applications of equipment. **Photo O** shows a dial assembly used on a



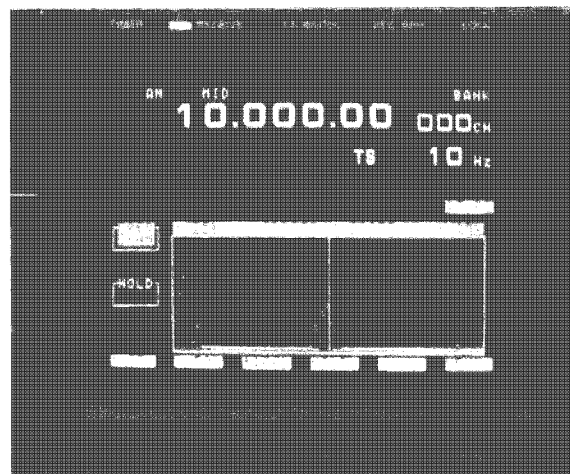
**Photo R.** A National ACN dial. A smaller version, MCN was also produced. This dial utilized a Velvet Vernier planetary drive mechanism. (Photo ref. 4, pg. 42)

wavemeter made by General Radio Co. The large dial is connected directly to the tuning capacitor and is controlled by a small knob located against the edge of the large dial, creating a friction drive. The small knob "feel" is equivalent to a "band spread," making the control of the dial very easy.

In this case, the large dial has been divided into three bands. Attaching the appropriate coil determines the band that is to be used. Accuracy of the dial indications is only relative in this situation because the application is that of an absorption wavemeter. Coupling between the signal source and the wavemeter can affect the resonant



**Photo S.** Shown is a thumbwheel digital dial. Dialing ambiguity was eliminated with the advent of digital technology.



**Photo T.** This is an oscilloscope display providing simultaneous feedback of both digital and analog functions.



point indication on the dial. As a result, knowing the relative frequency is sufficient for most uses.

An even simpler dial is the home-made one shown in **Photo P**. Dial markings are placed directly on the panel face using a black marking pen. A pointer knob is attached directly to the shaft of a tuning capacitor. Again, accuracy of the markings is relative to the function of the device. In this case, the markings show a band of frequencies where signal output peaking is expected to occur as a function of the harmonic frequency being selected.

Of course, dials are indicators of settings and hams always want to know where things are set. With the advent of 10-turn potentiometers, special dials were developed to accommodate multiturn devices. **Photo Q** shows one of the many types of multiturn dials that have been developed. This dial divides the 10 rotational turns into 1,000 repeatable setting increments. Multiturn devices have ham applications beyond one's imagination, but to name a few: varactor-controlled VFO, adjusting element in a bridge circuit, TV/VCR tuning control, and precision voltage calibrator.

Perhaps one of the most popular ham dials, which followed the design of the Velvet Vernier, was developed by the National Co.: the ACN and MCN dials. A large paper dial was attached to the planetary drive mechanism, creating a series of professional dials for hams as shown in **Photo R**. The ACN and MCN dial series gave hams a choice in dial size to fit their project. Five bands could be marked on the paper to customize a dial to meet the project's requirements. In addition, a 0-100 divider scale was included for calibration and logging purposes.

As technology advanced, it wasn't long before digital dials came into play. One of the early "digital dials" was of the rotating number counter type, as was used on the Collins R-390 receiver. Even though the early use of rotating digit dials was popular, calibration accuracy remained an issue due to the analog interface. In other words, the circuits had to be adjusted to track with the rotating digits. Later, when

digital took on a stronger emphasis in electronics, counting dials became specific as shown in **Photo S**. The dial shown is a thumbwheel-type dial where small levers are actuated to rotate the numbers and also the appropriate attached switch. With the equipment being digital, the user could count on the dial indicating exactly, in this case, what frequency was being generated. With digital designs, the accuracy of setting a frequency was shifted from a dial reading interpretation to the accuracy of the master clock.

So far, all of the dials shown have been in the physical realm. And of course, for a ham project builder, mechanical dials provide the greatest flexibility at the lowest cost and will continue to be used. But with technology advancing so rapidly, LCD and oscilloscopic dial displays are here now.

**Photo T** shows a receiver dial having an oscilloscopic display. The advantages of the scope tube and LCD display are the multiple menus and functions that can be displayed pretty much simultaneously with other functions. Both digital and analog functions may be displayed at the same time, providing increased information to the user. The "dial" is no longer just a numerical positioning device, but now communicates a wide variety of things appropriate to the application.

### Conclusion

Dials have come a long way in their development progress as a result of input from ham radio tinkerers and designers.

Hams have created a strong influence into equipment design and particularly the human interface with radio equipment. The dial has been the human interface with equipment right from the beginning, and that function has only become more complex with time. What will be the next contribution to dial development that hams will have in the future?

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# Twin for Two

*Give this home-made twin loop for 2m a try — and be surprised!*

*The full-wave loop antenna, with its large capture area, good signal/noise ratio, and excellent low-angle transmitting characteristics, is about as good as an antenna can get.*

That's what I thought, until I realized that doubling the capture area with two full-wave loops fed simultaneously is even better. Several years ago, I replaced my 2-meter J-pole with a 2-element quad, and I was very pleased with the performance of this antenna upgrade. Now that I have replaced the 2-element quad with the twin loop antenna, I am even more pleased. Scratchy signals from outlying areas are now registering 3/4 scale on the S-meter. Now I

can hear everybody on the local 2-meter simplex net and get a good signal back to them with 5 watts. I chose to make this antenna from 1/2-inch copper tubing because of its good conductivity and large surface area.

Here is a 2m antenna I constructed from info that I got from W7YP of western Wyoming. Of course, I changed it all around to suit my purposes, but the idea is the same.

W7YP had a 17m double delta. It was described to me as a W with a

horizontal line across the top, but the center apex of the W did not connect to the horizontal line. It is fed with 50-ohm coax. The outer braid connects to the center apex of the W, and the center conductor feeds to the center of the horizontal line, directly above the apex. In this way, two full-wave loops are fed simultaneously, one to the left and one to the right, radiating a great signal, and being outstanding on receive. The impedance is near 50 ohms.

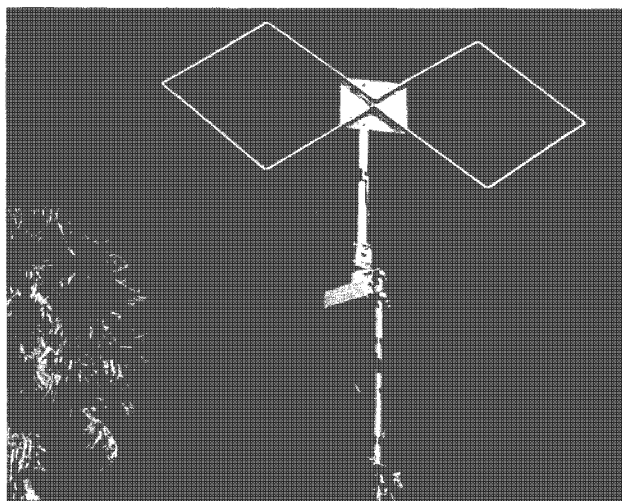


Photo A. 2m twin loop antenna.

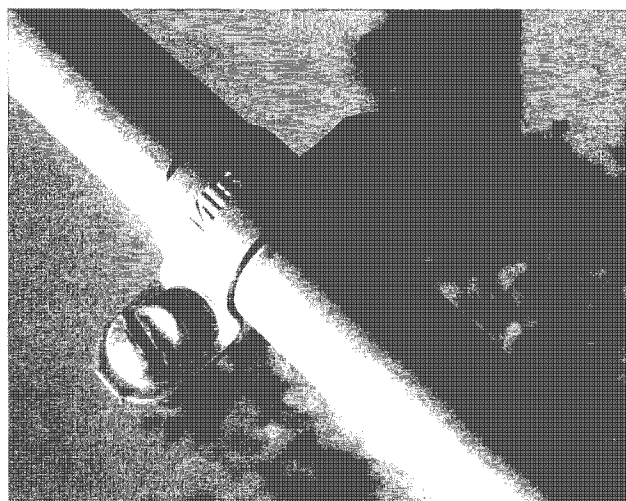


Photo B. Copper straps.



The double delta idea can be constructed in various ways. I decided to design and build a 2m version, which I will share with you, but you can use your own imagination on band, materials, and design.

My 2m twin loop antenna has two square loops made from 1/2-inch copper plumbing tubing (type M) and eight elbows. After sweat-soldering the eight elbows and eight straight pieces (20-1/4 inches long) together on a flat surface, it will resemble a figure 8 (**Photo A**). Use the armstrong method to spread it apart in the middle so that there is a 1-inch gap. Cut a piece of 1/4-inch plastic to 9-1/4 inches by 10-1/2 inches and put a 5/8-inch hole in the center for the SO-239 connector. The antenna is secured to the plastic using four copper straps, and 10-32 screws and nuts. Position the copper straps so that there is room to mount the 1-1/4-inch

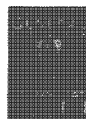
dowel mast to the plastic (**Photo B**). The dowel is 3 feet long, and has a flat area where it mounts to the plastic using two 10-32 screws and nuts as shown in **Photo C**.

### Tuning

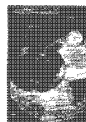
The SO-239 is connected to the antenna feedpoints with #14 stranded antenna wire. One wire is kept as short as possible, but in connecting the center conductor, use a piece of wire 4-1/2 inches long. Shape this wire like a U (**Photo D**). It can be lengthened or shortened to fine-tune the antenna to 146 MHz. This tuning loop also lowers the SWR, although I don't know why. My twin loop antenna has under 1.2-to-1 SWR across the 2m band. It is bi-directional, favoring the directions broadside to the loops, but reception and transmission to the sides is still good.

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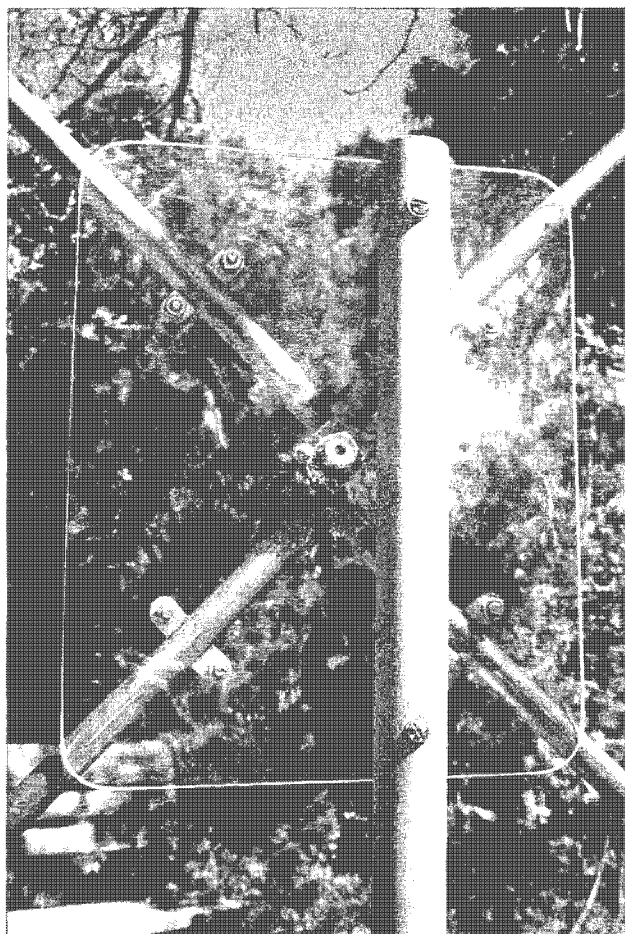
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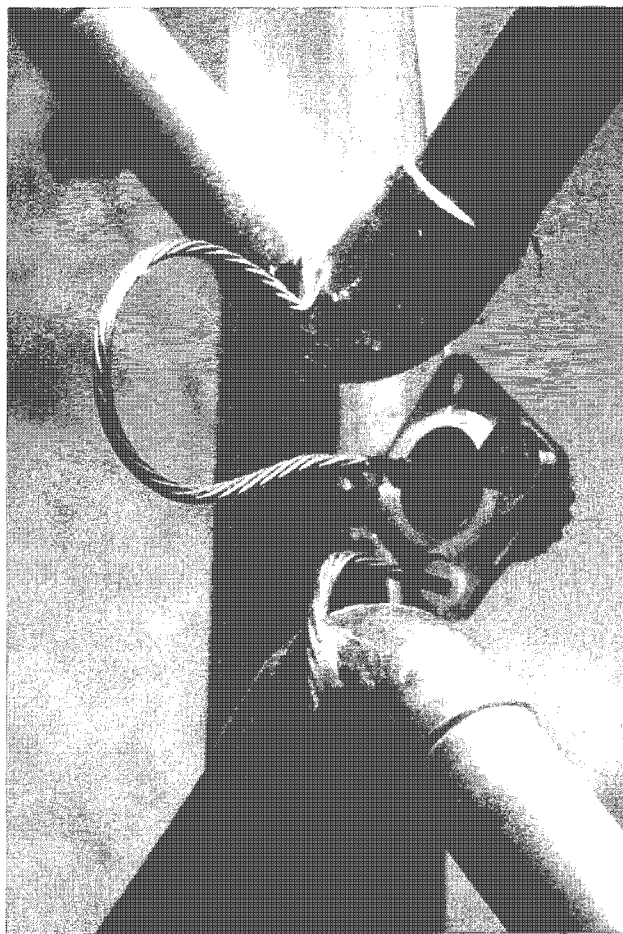
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**Photo C.** The dowel is mounted to the plastic by two 10-32 screws and nuts.



**Photo D.** A 4-1/2-inch-long piece of number 14 stranded antenna wire is shaped like a "U" to form a tuning loop for the antenna.



# This Thing Called Wire-Wrap

*Whether you refer to it as a technique, a technology, or just plain old-fashioned, wire-wrapping is still valuable to know.*

*What are the pros and cons of using wire-wrap technology? Well, let's check into it a little bit.*

**R**ight from the start, you must breadboard a prototype of the "want to be" new circuit to check the function and the expected performance. We folks with an engineering background know that a computer simulation is not less expensive, easier to use, and so on. Using the "freehand" design utilizing multisourced components requires a bread board to check the function. Expensive software packages, etc., just do not lend themselves to the ham radio community very well.

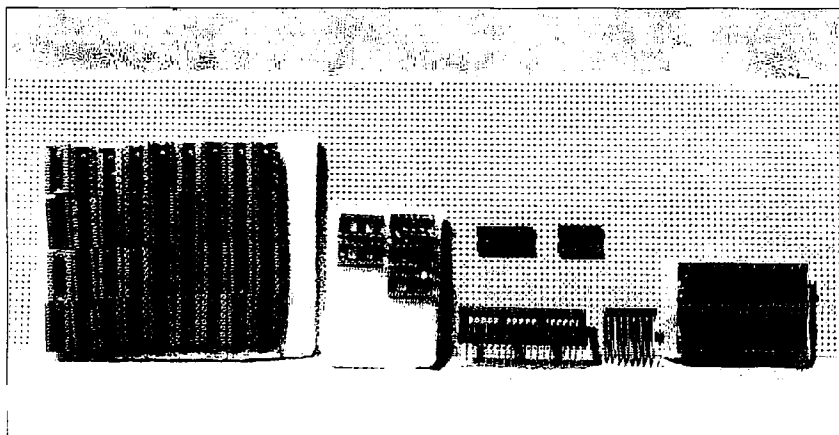
I have found over the years that a

good breadboard system such as shown in **Photo B** is very helpful. Pushing components into the grid system performs some of the interconnects. The rest of the connections are made with #22 solid wire jumpers. This is an inexpensive and effective system of breadboarding. The system is reusable many times over. You breadboard only small parts of the overall design just to verify the circuit function.

Now that you have a good-looking schematic of the item you are designing you can move on to the "wire-wrap"

portion of the circuit board that will go into the enclosure. If it is anticipated that 50 or more boards are to be made, such as a ham radio club project, then the finished schematic can be used to have an actual printed circuit board created. It will take about twice the board area if this is done, unless expensive multilayer boards are used. Remember, the computer software will require a computer-captured schematic which is costly and time-consuming. The schematic will provide a point-to-point grid for all of the interconnect routes. This is usually called a net list. If everything works out OK, a PC board foil pattern will be made. This will be used to make a PC board, etched, holes drilled, tin plate over the copper foil, and finally the silk screen with component markings. The etched PC board is expensive and a lot of work. It is not justified unless many boards are required!

Now, the alternative is "wire-wrap" technology. It uses point-to-point wiring using sockets and AWG-30 wire-wraps. If a mistake is made, a little "unwrapper" tool will remove the wire-wrap. Your local Radio Shack store has a wrapper/unwrapper tool.



*Photo A. CEM-1 perforated PC board and machined pin wire-wrap sockets.*



#RS-276-1570A, which sells for about \$8. The tool also has a wire stripper stored in the handle. A very nice tool for the price.

You might now ask, "Where do I get the IC sockets, perforated boards, and AWG-30 Kynar wire?"

There are several companies that supply these items, such as Jameco Electronics, Mouser Electronics, and Hosfelt Electronics. Make sure that the IC sockets are the machined-pin-type round pins so that the round wire leads of components can be accommodated. (Normally, a square pin is used for wire-wrapping sockets. The objective of the square pins is to create a gas-tight joint. Wire is pulled tight against the four corners of the pin to produce a reliable and permanent joint. The machined-pin wire-wrap pins on the DIP sockets are like ALL wire-wrap pins, square with four corners. The point the author is making is that a normal socket, not machine-pinned, will not accommodate a round wire such as is on passive components like resistors, capacitors, and diodes. Therefore, a DIP IC socket must have a machined pin. All DIP IC sockets used in wire-wrap have square lower pin construction. Key word: machine pins. — ed.)

Either the two- or three-level gold or nickel pins are suitable. When wiring a board full of sockets, it is recommended that the ground and supply wire leads be put into place first using black and red wires respectively. The interconnects can then be green or white wire. Several colors are available, so use the colors you prefer. The spools of wire are usually available in 100- and 1000-ft. spools. The cost is typically less than 3 cents per foot.

After a few projects are done, your confidence and expertise will improve to the point where any project will not be too hard. You will then want to move up to the high performance end of things to make everything easier and faster.

This of course requires some tools which are more expensive. The investment can generally be recouped in one good-sized project which would normally require an etched PC board. See **Photo C** for a look at some of the tools

which are used. Notice the 120 VAC wire-wrap gun and professional strippers. These are the high performance tools I mentioned. The gun shown is one that I picked up at a hamfest flea market for \$15. It came in its original package with a bit and sleeve. Ready to go! The same model's new cost is about \$200, plus the \$20 for a sleeve and bit. Still not bad, considering! The new tools are available from Mouser Electronics and others should you need to purchase new items. I purchased 1000-ft. spools of Kynar wire from Jameco Electronics at under \$30 per spool. The sockets usually cost between 35 cents and \$1.25 each for DIP-14, 16, 24. Either gold- or silver-plated sockets work equally well. The gold shows up a little better against the grid PC board for us old folks with bifocals. Bargains can be found, such as with Hosfelt Electronics, where DIP WW sockets can be had at 35 to 50 cents each.

I purchased over 100 DIP-14 and

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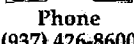
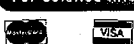
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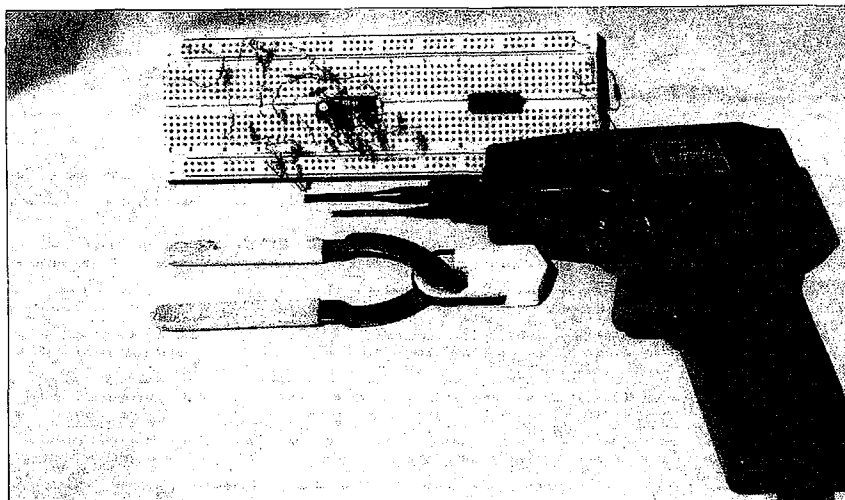
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**Photo B.** Breadboard prototype system with wire-wrap strippers and 120 VAC wire-wrap gun.

DIP-16 WW sockets, gold type, at a recent hamfest flea market at 8 cents each. A real bargain! I prefer brands such as Augat or similar types because they are solid plastic, which provides good mechanical strength. They also use specific colors for the various sockets so that easy identification is possible.

Now let us take a look at the PC board (perforated) to see what is available for our specific use. Never purchase phenolic boards. There are too many reasons to go into about that material! Use either CEM-1 or FR-4 materials. These board materials are available from Jameco, Mouser, Digi-Key, and others in the price range of from \$10 to \$20 each. I tend to use CEM-1 boards, 4.5- x 17-inch size, with the mandatory 0.1- x 0.1-inch hole space.

The price on these is about \$11 each. Take a look at the catalogs to see what you like for size and price.

The alternative to the CEM-1 is the more expensive FR-4 (green) board material. It is only necessary with RF or high frequency circuits where high impedance is of concern. I used CEM-1 type on a 400 MHz counter with no ill effects, so I am not at all sure that the extra 50% price increase is justified. I like the CEM-1 (white) board the best for these home-brew projects.

After doing a paper location drawing, you can insert the WW IC sockets into a board. If you prefer, and are sure of yourself, you can put a dab of 100% clear silicone caulk on the bottom of the socket and leave it overnight for a permanent fix to the PC board. I prefer to just wire-wrap the red wire for VDD

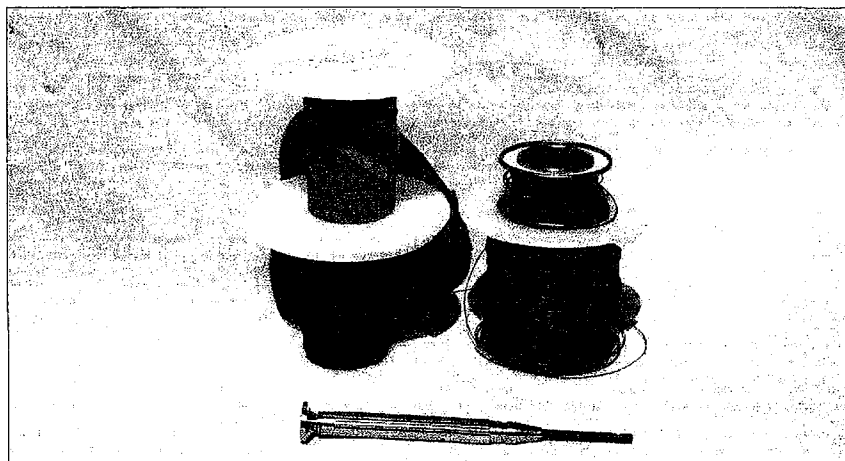
(+) and black wire for VSS (g) power connections. I use white wire for the VEE (-) power when working with linear ICs. This procedure keeps the sockets in place and provides the "housekeeping" interconnects of power to the sockets. You can build the power supply section of the project first, and then check each socket with a voltmeter to make sure that there are no mistakes. After all of that, you can start the interconnect wiring using green wire.

When cutting the board to your particular need, use either tin snips or a good sharp set of scissors. The material will cut very easily. Upon completion of cutting, use a double-cut file or sandpaper to smooth the edges of the board. You can then put several 0.75- to 1.00-inch standoffs on the board so that it will stand off the surface of a table and allow the wire-wrap sockets to clear that surface. This makes it easier to wire-wrap, also.

Sometimes a wire-wrap termination point is required to accommodate wires leaving the PC board to connect to switches, pots, other boards, etc. The best way to handle this, I found, is to use a SIP-40 header. (By the way, DIP means dual in-line, and SIP means single in-line.) When using an SIP, you can weave the wires in and out of holes before wrapping to the post. This allows a strain to be placed on the wire without causing the wire to unwrap itself when leaving the PC board.

Now we have to consider all of those wires and where they are going. The best method I found to keep track of things is to make a copy of your schematic as a working spreadsheet. Next, get a new yellow felt marker, sometimes called a "Hi-Liter." After each wire connection and conformation using a continuity checker to verify the connection, you can mark the schematic to show that the wire connection is complete. This method works well! Upon the completion of the board and verification of the circuit's performance, we are on to an enclosure.

Now that we have a good working project that needs an enclosure, we can take a look at a few types. I tend to move to Ten-Tec's JW series for my projects. Other choices are also available in the \$10 to \$25 range.



**Photo C.** A wire-wrap/unwrap tool, with spools of AWG-30 "Kynar" WW wire in the background.



I lay out a front and rear panel scale drawing to make sure everything fits OK. When happy, I mark and drill the holes. The Ten-Tec enclosures are aluminum except for the plastic side panels. Woodworking tools work well on these aluminum enclosures. A little scratching occurs when drilling, saber sawing, and filing, so you will want to spray paint after all of that stuff. I found a spray enamel paint at my local "ACE" hardware store called "almond" color (#1003979). It dries to an eggshell white color and looks pretty good.

I then use the black "rub-on" decals which Radio Shack and others make available for about \$3 a package. A package can do several projects. When everything looks good, spray the complete aluminum enclosure with a couple of coats of polyurethane spray. I like Min-Wax's "Varathene" gloss type, but any type will work. Now, in the area of component procurement you have to always check out the hamfest flea market items. Inspect carefully! Other sources are given at the end of this article. Use their free 800 telephone numbers for a catalog request.

The next question is, "Where do I get power for these projects?" In the old days, we had a 120 VAC power line and a transformer to deal with. That is dangerous and costly and besides, vacuum tubes are a thing of the past except for those HF linears. Nowadays we can use the wall-pluggable power converters. These are UL-, CSA-, VDE-approved devices that bring in the low-voltage, class II, AC power, and better yet the DC power. Some even come with built-in DC voltage regulators. The prices range from \$2 to about \$10, depending on the VA (watts) rating of the transformer device. Make note that sometimes AC types have a center tap also, so now you can have those POS and NEG supplies for linear projects. Do not forget that two AC types can be made to do the job also.

Next comes the technical information. Many sources are available from catalogs, magazines, *ARRL Handbook*, *W1FB notebook*, and loads of flea market boxes of old semiconductor databooks. New databooks are available

for about \$20 each if you get desperate. Most technical databooks are on CD (compact disk) and require a computer with Windows, etc., to use them, or an Internet connection and patience to get your information. Component suppliers are really helpful if you want only one datasheet along with your purchased component. Customer service is great!

Home-brewing can never be dead if we just get with it. Wire-wrap makes it easy and enjoyable. With proper photographs and a little manuscript writing, the magazines will give you \$100 for an article and your name in print besides. The magazine readers will certainly appreciate your efforts and will send you letters telling you so. Some will be good and some not so good, but you will have made them finally get moving. Home-brewing is an old and honorable part of this hobby. It is what got this thing going in the first place. Appliance operating is something new which came about with the flood of rice boxes and CB appliance operators. Let's get some good homebrew stuff going like the Japanese and English hams still enjoy. 73, Carl K8IHQ.

#### Resources

Jameco Electronics, 1-800-831-4242.  
Mouser Electronics, 1-800-346-6873.  
Digi-Key Electronics, 1-800-344-4539.  
Hosfelt Electronics, 1-800-524-6464.

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# Travels with Henryk — Part 7

*Hams in the Åland Islands OHØ.*

*Each and every one of these islands is small, and you won't see them on the world map. But there are 6,500 of them, so someone must have counted.*

**M**ost of the 25,000 people who live here are to be found on the main island. There is the capital city, Mariehamn, where the local radio club, OHØAA, has a nice clubhouse. The club was founded in 1959 and is "still going strong." Almost 50 members, a contest station on one of the hills, FM and digital repeaters — just to mention a few pieces of evidence of their well-being.

When approaching Mariehamn by car from the west, the way I usually take, you can hardly avoid seeing the impressive 100-ft. antenna tower of

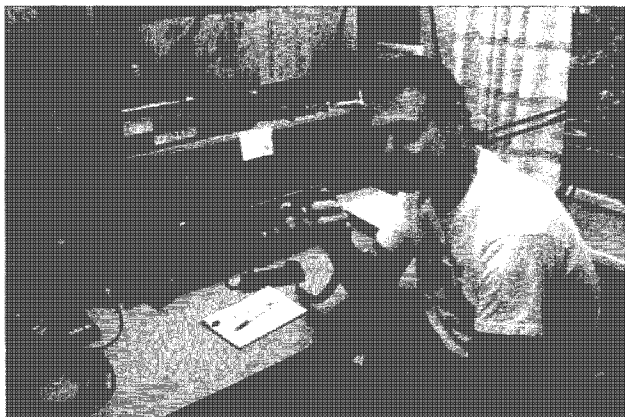
Roland OHØAZX. The CNN T-shirt he wears in the picture (**Photo A**) indicates that he is in the TV business. To be exact, in cable TV. 50 MHz and up are his favorite bands; the high antenna tower is advantageous on these frequencies.

Melcher OHØQF (**Photo B**) has a simple wire outside of his house, almost invisible. He is the oldest ham in the islands, a retired medical doctor. Every morning, he talks to his friends in Finland and Sweden on 80 or 40 meters. In spite of being well over 80 years old, Melcher is no enemy of modern computers.

Marcus OHØHEH (**Photo C**) is into computers. He works for a media company and helps the club with software problems. His very neat station is accomplished with an impressive array of VHF-UHF antennas outside.

His neighbor, Guy OHØNH, is mainly interested in lower frequencies and has an HF yagi on the backside of his house. In the basement (**Photo D**), he has a lot of gear, tools, and instruments. He still believes in home-brewing radio equipment.

But Harry OHØAZZ is a full-time experimenter. His home is filled with



**Photo A.** Roland OHØAZX in his radio shack.



**Photo B.** Melcher OHØQF at home.





**Photo C.** Marcus OHØHEH — a very neat and modern station.



**Photo D.** Guy OHØNH in the basement shack-shop.

so much radio and electronic items of different vintages that he has no space for on-the-air operating. He helped a few younger hams build a VHF-UHF contesting site, where they use the callsign OHØAB. In the picture he sits in front of 50-144-432-MHz stacked rigs (**Photo E**) at this station.

The one who is more interested in HF and DXing is Lars OHØRJ. Living very close to the sea gives him the advantage on long-haul communication (**Photo F**). Lars is often on the air and logs 10k QSOs a year.

Sture OHØJFP (**Photo G**) is a very ambitious person. During the past year or so, he built a complete VHF-UHF station out of town, with large arrays

for each band from 6m to 23cm. He wins the local activity contests with ease — after all, the Åland Islands lie between Finland and Sweden, two countries with large ham populations. The picture was taken at Nyhamn lighthouse during the Lighthouse Weekend Activity.

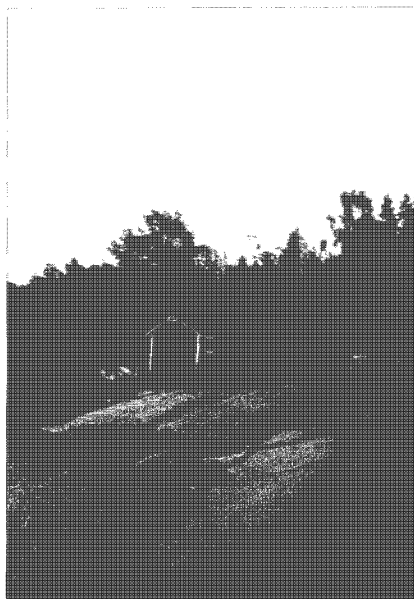
The person who has access to every lighthouse in the archipelago is a retired lighthouse keeper, a skipper, and a nautical pilot — Karl Erik OHØNA. Karl Erik, nicknamed Kee, is the only one of all the above mentioned people who lives outside of Mariehamn. His home is in Saltvik, a few miles north of the capital. Kee is the president of the OHØAA radio club, but is sometimes

active from his home as well. Apart from a high tower in the forest, he has a multiband vertical in front of the house (**Photo H**). Kee was introduced to amateur radio in a spectacular way — in 1969, he served as lighthouse keeper on Market Reef and the first DXpedition landed there. He got interested in this wonderful hobby then. He obtained the callsign OHØMA and has made countless contacts since then. One day, I plan to convince Kee to go back to Market Reef for a radio expedition. It might be this summer — you never know.

Visitors are always welcome in the Åland Islands. Should you be in this vicinity in late August, come along and



**Photo E.** Harry OHØAZZ in the OHØAB contesting station.



**Photo F.** The radio shack and antenna of Lars OHØRJ.





*Photo G. Sture OHQJFP in Nyhamn, a small island south of Mariehamn.*

join the local hams in some lighthouse activity. The Mother Nature part alone is worth it, even if propagation that far north can be poor.

The islands have a high degree of autonomy. The League of Nations ruled

for it in 1918, when Sweden and Finland argued about this territory. Almost all people here speak Swedish, but officially it is a part of Finland. Today it is a peaceful place, appreciated by thousands of visitors every summer.



*Photo H. Karl Erik OHQNA checks the coax cable to his multiband vertical at home.*

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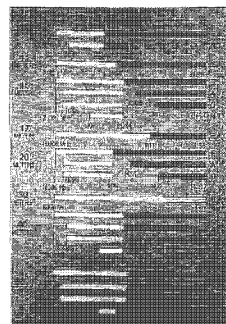
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# Read All About It!

*Part 11 of good stuff from The Hertzian Herald.*

## *The Antenna Raising*

Ah, to have reached my fifty-third year, the age of maturity and wisdom! The kids were grown up and moved out of the house. I had survived my midlife crisis by buying a boat, realizing what a poor cost/benefit ratio it represented, and selling it after five years. Now it was time to get back to the passion of my youth — amateur radio.

A morning at my local hamfest got me a low-band transceiver (everybody called it a “rice box”) for what seemed to me a very reasonable price. The antenna, however, was a more difficult problem. Antenna supports had not been on the list of desirables we had presented to the Realtor when we bought our present home. The front yard sported only a few ornamental trees, the back yard was a ravine sloping down to a creek 40 feet below street level, and there were deed restrictions against antennas in the whole ‘hood.

Well, the main roof gable was 45 feet long, so I put a couple of two-foot poles at either end, halfway down the back slope and tucked a 20-meter dipole neatly out of sight on the back side of the roof. That was fine, but my first love had always been 40 meters, and that takes 66 feet; 45 won’t do.

A few measurements on the gable, and some trigonometry showed that a ten-foot pole at the center of the ridge would support four “guy wires” of 34 feet to each corner of the roof. I bought a length of 3/4-inch conduit, painted it black, and put up a parallel dipole for 40 and 20, and the devil take the deed restrictions.

All quite satisfactory, until I got hooked on antique radios and CW rag chewing; all that activity is on 80 meters, and no way could I find space to stretch out a 132-foot dipole. Then I remembered the 99-foot long-wire I had used at my last QTH: three quarter-waves on 40 (a purely resistive load), and 3/8 wave on 80 (an inductive load, easily tuned out with a simple series variable capacitor). So I snaked the wire up the side of the house, across the roof to the chimney, up to the ridge, down the front slope,

and over to the front of the garage gable. I connected a ground wire to the city water pipe, which happened to be right next to the operating position in the basement, and fired up the rig.

As I was tuning up I heard water start to run in that pipe. Going upstairs to investigate, I found that the sprinkler system had been triggered, all five zones spraying away like mad. And the garage door was gaping wide; the opener had been triggered. And the burglar alarm was going off; the cops were on their way. I asked the XYL to phone the company that it was a false alarm, but she had already tried, and the phone wasn’t working; so apparently I was getting into that, too. Then the front doorbell rang.

It was my neighbor — with his dog. Close up, the dog looked a lot bigger and more menacing than he had seemed from a distance. The neighbor had just installed one of those invisible fences, with the electronic collar that zaps the dog if he wanders out of bounds. He said the dog had been sleeping comfortably when he suddenly woke up yelping and jumping,



# The Hamfest from Hell

*Are you in this story?*

*A few years ago, I wanted to travel to a hamfest three hours from where I live, but my usual hamfest buddies were not available because the date was so close to a big holiday. I did not want to drive that far alone in the dark. But this hamfest was quite big and has many commercial dealers, and I did not want to miss it.*

So, a week before, I checked into the Wednesday Night Trader's Net on 2 meters and announced that I was looking for a travel partner and that I would pay for the gasoline. A few days later I received a call from "Fred," who said that he would take me up on my offer. (Actually his real name is not Fred. I think it is best if I do not reveal his true identity.) This was great! I was all set.

During the next few days, however, I received many warnings that if I went with Fred, he would drive me crazy. "Don't go to a hamfest with Fred." But I've gone to hamfests in pouring rain and still had a good time. I've gone in snowstorms. I was even at the hamfest the year a tornado tore off part of the roof of the Hara Arena in Dayton. I still had fun. I have gone to hamfests with many different guys over the years, with no problems. And I have known Fred for a very long time, so how bad could it be?

Or so I thought.

Fred and I agreed to leave 2:30 a.m. so that with one stop for breakfast we would arrive at the hamfest around 6 a.m. He would drive his truck and I would pay for the gasoline.

Here is what happened.

I find hamfests so exciting that I rarely get much sleep the night before. So I set my alarm and awoke at 12:30 a.m., two hours early, in order to be certain that I would be ready on time. But at 2:30, our agreed-upon time, Fred was not there. At 3:30, still no Fred. I called his house. His wife said that she would "try" to wake him, and that he would call me back. At 5:00 a.m. he finally arrived. Now we were 2-1/2 hours behind schedule. He said that he had gone to a party the night before and was too "tired" to drive, so I would have to drive his truck. It was the big old truck with no power steering. Candy wrappers, soda cans, and other debris littered the dashboard, seats, and floor, but I figured that maybe it would be nice to have such a large truck in the event that I wanted to buy something big at the hamfest.

As we drove off, the first thing Fred told me was that he had forgotten to fill the tank with gas. This set us back another 15 minutes. He said that his truck only takes the very expensive, super-high-octane gasoline, and only gets about 6 miles to the gallon. Our round trip would be 300 miles. That

would be 50 gallons. This would be a very expensive hamfest.

Driving his truck proved to be very tiring, as it pulled to the right and the steering wheel wiggled and vibrated in my hands. The accelerator pedal had a very tight spring that made my foot ache. I arrived at the hamfest exhausted. By this time, I had been awake for eight hours, with very little sleep the night before.

The hamfest had that "picked over" look. We arrived late, so all of the best bargains were already sold. There was, however, one large item that I wanted to buy, but it turned out that Fred could not open the truck's back gate because he had forgotten the key. I had to pass it up.

Finally, it was time to go home. I was tired and anxious to go. As we reached the interstate, Fred said that his grandmother lived in the next city over, and that he would like to stop by for a few minutes and say hello. So we got back off the interstate and began to travel around the streets of this city. We drove around and around, until Fred admitted that he was not exactly

*Continued on page 59*



# The Write Stuff

*Here's a work-at-home scheme that is no scam.*

*Say now, that's a really nice project you've just finished! I bet that you're proud enough to "pop the buttons" off your shirt, or will at least "brag" a little about it at the next ham club meeting. Maybe you'll even take it along to "show off" just a little.*

**A**nd you're allowed to do that! Really!! The other club members are going to gawk and mumble things like, "nice job, couldn't have done better" ... or you shoulda coulda woulda done it this or that way. (Envy rears its ugly head, and these comments I find come from those whose last project was a "Tinker Toy" windmill during the Truman administration.)

All you have to do is stand there and take the praise. You know that you did a fantastic job, and the end product shows it.

"It's only a kit," is your feeble excuse, or maybe the project didn't require a lot of technical "know-how," or it's not even a radio, but a project related to our hobby. Maybe you helped teach a license class, or worked with the Boy Scouts to help them earn their radio merit badges.

"I wasn't the 'main speaker' and all I did was —" and I will never know what you did, unless you tell me.

So, why are you keeping it a secret from the rest of us? I don't live next door to you, but I would really like to see and hear about your latest effort. We like to admire the work of fellow

amateurs, see what the other guy is doing, and maybe gain some inspiration for a project of our own. Not all of us build projects that require a degree in advanced electronics — simple ones are just fine for me! They allow me to begin building slowly, gaining knowledge and confidence as I go. Later, I'll tackle the more advanced ones, but for now I'll stick with the ones I think I can handle without too much trouble. And not just building things either — community and club events interest me, too.

"My writing skills 'stink.' The teacher failed me X years ago because I couldn't tell a sentence from a baseball," you lament.

Well, you've sort of got me there. I know how it is to think that your skills aren't the greatest in this area, but guess what?! I'll bet there's somebody near you who can handle the writing chores, if you can provide the technical part! You should try writing the article yourself first. It may not be the greatest literary work you've ever done, but you won't know until you've tried it! Besides, your ghost writer can use it as a starting point to put your article in better form.

The same is true if your article should have pictures. You know who the camera "nuts" are in your area. They're just waiting to be asked to help you with your project. Their world has a language of its own, like "F" stops and bus stops and whatever other "stops" they gloat over. Of course, you'll have to share the "by-line" with them if the piece gets published, but this is a price that may have to be paid if you want to see your name in print.

"I don't know what to write about," seems to be the next comment.

That's an easy one: Write about what you know best! You're the one who's familiar with the project and made it through to the finish. Use those old adages from school; remember Who, What, When, Where, and Why? If your article can address these questions, you're well on your way to success. Tell me honestly and truthfully about the project. Adding "fiction" to glorify the piece may be impressive to you, but can be embarrassing when "Joe Engineer" comes back with "that can't be done" responses. So don't do

*Continued on page 59*



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the November issue, we should receive it by August 31. Provide a clear, concise summary of the essential details about your Calendar Event.*

## AUG 3

**COLUMBUS, OH** The 12th Annual Columbus Hamfest, sponsored by the Voice of Aladdin ARC, will be held Saturday, August 3rd, at the air conditioned Aladdin Shrine Complex at 3850 Stelzer Rd. Talk-in on 147.24(600 MHz). Directions: Exit I-270 at the Easton exit. Proceed west to the first light, then turn north (right). The Aladdin Complex is located about 1/10 of a mile up the road on the right. Entrance to the hamfest is near the rear of the building. Commercial exhibits, flea market, free seminars, refreshments, VE exams. Exams being conducted at 9:30 a.m. Please be on site to register no later than 9 a.m. if you are planning to take an exam. Admission tickets are \$4 in advance, \$5 at the door. Children under 10-years-old admitted free. Indoor display tables (6 ft.) are \$6 in advance, \$8 each at the door. Outdoor flea market is \$5 per marked parking space the day of the hamfest. Deadline for advance tickets and tables is July 20th. Advance sales available at Universal Radio and Hall Electronics in Columbus OH; the Aladdin Shrine Complex, or with an SASE sent to: Jim Morton KB8KPJ, 6070 Northgap Dr., Columbus OH 43229-1945. Phone 614-846-7790 evenings for further info. Visit the club Web site at [http://www.qsl.net/w8fez].

## AUG 10

**LONGVIEW, WA** The Lower Columbia ARA, W7DG, will sponsor its 11th Annual Ham Radio, Computer, & Electronic Equipment Swap Meet from 9 a.m. to 1 p.m. at the Cowlitz County Expo Center in Longview. There is 14,000 sq. feet of indoor sales area, with tailgate sales outside. Admission is \$5, tables are \$12, tailgate spaces are \$6, with free space and admission for commercial dealers. Also, northwest radio clubs can contact the ARA for a free club table; table attendants will pay only for admission. Food concessions; free parking; overnight RV parking on the fairgrounds for \$12, electrical hookup available. Sorry, no VE exams. Vendor setup on Friday 5 p.m. to 8 p.m., Saturday 7:30 a.m. to 8:45 a.m. Talk-in on 147.26(+), PL 114.8. Take Exit 36 or 39 off Interstate 5 and follow the signs west for the Expo Center (fairgrounds). Mt. St. Helens and the Oregon coast are nearby. For more info, write to LCARA Swap Meet, P.O. Box 906, Longview WA 98632; or call Bob KB7ADO at 360-425-6076 in the evening. E-mail to 42 73 Amateur Radio Today • August 2002

[KB7ADO@aol.com]. An Internet link to the flyer is at [www.qsl.net/nc7fp].

## AUG 11

**BAYVILLE NJ** The Jersey Shore ARS will host their Hamfest "Shorefest 2002" August 11th at the Bayville Fire House, Route 9, Bayville NJ. Talk-in on 146.910 MHz PL 127.3, and 443.350 MHz PL 141.3. Setup starts at 6 a.m. and the doors open to the general public at 8 a.m. Admission is \$5. Tables, reserved in advance only, are \$15 each, first come basis, includes one admission. Contact Bob W2CE at 732-657-9339 or [hamfest@jsars.org]. VE exams registration is at 11:30 a.m.; testing starts at 12 noon.

**GREENTOWN, IN** The 5th Annual Greentown Hamfest will be held 7:30 a.m. to 1 p.m. at the Greentown Lions Club Fairgrounds. Talk-in on 147.24 and 146.79. Handicapped parking available. VE exams — anyone who obtains a license or upgrade at this testing session will be admitted free. Tickets are \$4 each in advance, \$5 at the door. 17 and under admitted free. Vendor setup Saturday 6 p.m. to 8 p.m., Sunday 5:30 a.m. to 7:30 a.m. Inside tables \$8 plus ticket; tailgate setup \$3 plus ticket. Vendors pre-register by sending form or E-mail to [k9nqw@arrl.net]. Web site [www.grantarc.com/greentown.html]. For more info contact Greentown Hamfest, c/o L.B. Nickerson K9NQQ, 517 N. Hendricks Ave., Marion IN 46952, or phone 765-668-4814. This event is being co-sponsored by Kokomo and Grant County Amateur Radio Clubs and the ARRL.

**ST JOSEPH, MN** The 55th St. Cloud Amateur Radio Club Hamfest invites all radio hams and those interested to the Middle of the State Flea Market and Fun Time. It is being held August 11th at the Del-Win Ballroom, located on Hwy. 75 and 88th Ave. near St. Joseph MN. Talk-in is on 147.015 MHz, gabbing on 146.940 MHz. VE exams at 1 p.m. For current info, see the Web site at [www.w0sv.org].

## AUG 16, 17, 18

**ESCONDIDO, CA** The ARRL Southwestern Division Convention for this year will be held at the California Center for the Performing Arts, August 16, 17, and 18. Exhibits will be set up in the ballroom. Free parking for both exhibitors and attendees. Secured hotel rooms at excellent rates at hotels within a three-mile

radius of the convention site. Drawings all day Saturday August 17th, each hour 9 a.m. to 5 p.m. To request information, please contact Nancy Paine KD6WUL, Exhibits Chairwoman, at 619-466-4216; or John Hudson III WB6HYQ, Convention Chairman, at 619-525-4291. E-mail [npaine@earthlink.net].

## AUG 17

**OAKLAND, NJ** The Ramapo Mountain ARC will hold its 26th Annual Ham Radio and Computer Flea Market on Saturday, August 17th, at the American Legion Hall, 65 Oak St., Oakland NJ 07436. Talk-in on 147.49/146.49 and 146.52 simplex. Vendors' setup starts at 6 a.m. The event is open to buyers 8 a.m. until Noon. The kitchen opens at 7 a.m. Donations \$4. Spouse and kids admitted free. Inside tables \$10 each. Tailgate space \$8 per space. Please contact Steve Oliphant N2KBD, 10 Glen Rd., Ringwood NJ 07456-2331. Phone 973-962-4584, fax 973-962-6210, Club E-mail [rmarc@qsl.net]. Visit the Web site at [www.qsl.net/rmarc].

## AUG 17, 18

**HUNTSVILLE, AL** The Huntsville Hamfest will be held Saturday and Sunday, August 17th and 18th, at the Von Braun Center, 700 Monroe St., Huntsville AL. "America's Friendliest Hamfest" is a sanctioned ARRL Alabama Section Convention. Admission is \$6, under 12 free. Doors open both days at 9 a.m. All activities are indoors. VE exams will be held both days at 10 a.m. The big event will be the National Young Ham of the Year (YHOTY) award presentation. Forums include ARRL, MARS, Skywarn, QRP, APRS, AMSAT, WARC 2003, and more! Convenient parking, giant dealer/manufacture show. Huge flea market. E-Z drive-in vendor unloading. DX banquet. Friday and Saturday night there will be Hospitality rooms at the nearby Huntsville Hilton. Talk-In on 146.94 K4BFT. Call the Huntsville Hilton for special Hamfest Rates, 256-533-1400. Contacts: General info, 256-880-8004; dealer show, 256-536-3904, [DonTunstall@hamfest.org]; flea market, 256-883-2760; forums, 256-539-8950; DX Banquet, 256-721-5996. Visit the Web site at [www.hamfest.org].

## AUG 23, 24

**ALBUQUERQUE, NM** The 2002 Duke City



Hamfest will be held Friday and Saturday, August 23rd and 24th, at the University of New Mexico Continuing Education and Conference Center, 1634 University Blvd. NE. in Albuquerque. The building is one-half mile south of I-40 on University Blvd., just north of the intersection of Indian School Rd. and University Blvd. Hours are Friday, 5 p.m. to 9 p.m.; Saturday, 7 a.m. to 3 p.m. Flea market, free outdoor tailgates, VE exams, forums. Free admission. Talk-in on 145.33(-) 100 Hz and 444.00(+) 100 Hz. RV parking (dry camping only, no hookups). Indoor tables \$12 (no power) and \$18 (with power). Contact Richie Allen KC5NZR, 1624 Columbia Dr. SE, Albuquerque NM 87106; phone 505-242-0208; E-mail [kc5nzs@arrl.net]. Get the latest info from the Web site at [www.qsl.net/dchf].

#### AUG 24

**LAPORTE, IN** The LaPorte ARC will hold their LPARC Summer Hamfest August 24th at the LaPorte County Fairgrounds, State Rd. 2 West of LaPorte, 7 a.m. to 1 p.m. Admission \$5, Table \$10, outdoor tailgating \$2. One admission included with table reservation. Talk-in on 146.52 and 146.61(-) PL 131.8. For info contact Neil Straub WZ9N, P.O. Box 30, LaPorte IN 46352. Phone 219-324-7525. For table reservations E-mail to [tables@k9jsi.org]. The Club Web site is at [www.k9jsi.org].

#### AUG 25

**DANVILLE, IL** The Vermilion County ARC will hold their 2002 Hamfest August 25th at the Vermilion County ARC clubhouse, Woodbury Hill Rd., Danville IL. For more info contact Terry Powell KB9REE, Vice President, V.C.A.R.A., P.O. Box 80, Catlin IL 61817-1007. Phone 217-446-1379, or E-mail [KB9REE@YAHOO.COM].

#### AUG 31

**ALAMOGORDO, NM** The Alamogordo ARC will host their 18th Annual Hamfest August 31st, 7 a.m. to 3 p.m. at the Otero County Fairgrounds in Alamogordo. Admission is free. Talk-in will be on 146.800 with 100 Hz tone. Pre-registration for door prizes is \$5, \$6 at the door. Pick up pre-paid tickets at the event. Registrations received by August 29th are eligible for the special pre-registration door prize, a dual-band mobile. Main door prize is an HF transceiver; 2nd prize, a dual-band mobile; 3rd prize, a 2M mobile. Food available at the fairgrounds, and it's close to White Sands Mall. A No-Host Banquet will be held Saturday at 7 p.m. All facilities are air conditioned. Ample parking space. VE exams, ARRL forum, traffic net forum, MARS forum, hourly prizes. Reserve swap meet tables, \$5. For additional info please contact Richard R. Norton KB7SQF, 505-443-6190; Larry Moore WASUNO, 505-437-0145. Pre-registration contact is June Richmond K5BHE, 505-437-

0298. E-mail inquiries to [k5lrw@zianet.com]. To pre-register by mail, send payment with your name, call sign and address to Alamogordo Amateur Radio Club, ATTN: June Richmond K5BHE, P.O. Box 1191, Alamogordo NM 88310.

#### SEP 7

**BALLSTON SPA, NY** The Saratoga County R.A.C.E.S. Assn. Inc. will hold its 17th Annual Hamfest Saturday, September 7th, at the Saratoga County Fairgrounds in Ballston Spa. This will be held all under cover, rain or shine. Gates open at 7 a.m., with the hamfest running until 3 p.m. Admission is \$5 (includes 1 tailgate spot and free parking). There will be door prizes, a fox hunt, VE exams, and plenty of food. Talk-in on 146.40/147.00 and 147.84/24. Reserved tables \$5 each, first come, first served. Reservations and pre-pay are encouraged. Early setup for all vendors. For further info or reservations contact Darlene Lake N2XQG, 314 Loudon Rd. #84, Saratoga Springs NY 12866; phone 518-587-2385. E-mail [lake@capital.net].

#### SEP 8

**SOUTH DARTMOUTH, MA** The Southeastern Massachusetts ARA, Inc. will hold its annual flea market on the club's grounds at 54 Donald St., South Dartmouth MA. The event will run from 9 a.m. to 1 p.m. Talk-in on 147.00/60. Admission \$2 (spouse and children free). Food, door prizes, and more. Free space for vendors! For further info contact Tim Smith N1TI at 508-758-3680, or by E-mail at [rt\_smith@yahoo.com].

#### SEP 21

**NEW PORT RICHEY, FL** The Suncoast Amateur Radio Club will host the 12th Pasco County Hamfest at New Port Richey Rec. Center, 6630 Van Buren Rd., New Port Richey FL, 9 a.m. to 4 p.m. Talk-in on 145.35(-) rpt. Admission \$5, XYs and under 12 admitted free. 8 ft. inside tables \$15 each; electric \$5. Tailgate spaces \$3 each. You must have admission to enter tailgate or exhibit hall. For info contact Tim WD8MVU, 727-848-0353. E-mail [TRobin@homeemail.com].

**ROLLING MEADOWS, IL** The Northern Illinois DX Assn. will sponsor the 50th Annual W9DXCC Midwest DX Convention and Banquet, Saturday, September 21st, at the Holiday Inn in Rolling Meadows IL. Details and registration form are at [www.w9dxcc.com]. Friday, September 20th, there will be a Welcome Reception hosted by Carl Smith N4AA and DX Publications. Late Friday, a Hospitality Suite will be hosted by the Northern Illinois DX Assn. Stay late Saturday night for the Hospitality Suite being hosted by the Greater Milwaukee DX Assn. An ARRL Forum and presentations by major DXpeditions will be happening on Saturday at the main event.

#### SEP 22

**NEWTOWN, CT** The Western CT Hamfest will be held 9 a.m. to 1 p.m. at Edmond Town Hall, Rt. 6. Exit 10 off I-84. Follow signs. Setup at 7 a.m. Talk-in on 146.67/17. New equipment dealers, flea market, tailgating, electronics, computers, refreshments. Tables \$10, tailgating \$6 (each includes one admission). Admission \$4, under 12-years-old free. For reservations and info, contact John M. Ahle W1JMA, 120 Fire Hill Rd., Ridgefield CT 06877. Phone 203-438-6782; E-mail [W1JMA@aol.com]. This event is being sponsored by the Western CT Hamfest. Thanks to the Candlewood ARA of Danbury CT for this announcement.

#### SEP 28

**LAWRENCEVILLE, NJ** The Delaware Valley Radio Assn., W2ZQ Hamfest, will be held rain or shine, September 28th, at the NJ National Guard Armory, Eggerts Crossing Rd., Lawrenceville NJ. Talk-in on 146.67(-) 131.8. Vendor setup at 0600-0800; general admission 0800-1400. Admission \$6 per person, under 12-years-old free. Tailgate vendor \$10, includes one admission. Indoor vendor \$15, includes one admission. Indoor vendor wall space with electricity \$20, includes one admission. Extra tables \$10 each. For more info contact Glenn Costello N2RPM, [abbott0903@aol.com], phone 609-882-2240. Visit the Web site at [http://www.w2zq.com].

#### OCT 5

**WARSAW, MO** The Twin Lakes ARC will sponsor the Warsaw MO Hamfest Saturday, October 5th from 9 a.m. to 4 p.m., at the Warsaw Community Bldg., one block west of the square. Talk-in on 147.300 on the Warsaw rpt. Setup is at 5:30 a.m. Admission \$2 at the gate. 8 ft. tables \$10 each (hurry, only 30 available). Breakfast and lunch will be served on site. For more info call Gene at 660-438-8650, or E-mail to [gpo@advertiser.net].

#### SPECIAL EVENTS, ETC.

#### AUG 10, 11

**MARYLAND-DC QSO PARTY** On the air 1600-0400 UTC August 10th to 11th, and 1600-2359 August 11th. Suggested frequencies: 3.643, 3.92, 7.07, 7.23, 14.055, 14.268, 21.115, 21.37, 28.055, 28.38, 50.15, 52.525, 146.55, 146.58 and 446.00 MHz. Try CW on the odd half hours. Scoring: Add up your QSO points and multiply by the sum of the multipliers. Multipliers may be claimed once each and they do not repeat from band to band. QSO Points: 10 points per club station, 5 points per mobile station, 4 points per QRP station, 4 points per Technician

*Continued on page 59*



## Converting Surplus: A 1296 MHz 5 Watt Amplifier — Part 2

*This month is a continuation of last month's column that concerned a 1 watt power amplifier PC board that we obtained in surplus for the 1296 MHz amateur band operation.*

This time, the focus is on converting a higher power module that is capable of a minimum of 5 watts output and can be pushed to higher output power levels. There is some similarity between the surplus modules and commercial modules that are available for this same frequency band that do not require modification. Existing modules are the older Mitsubishi M57762, see **Photo C**, and the newer Mitsubishi M67715 1296 MHz power amplifier 5 watt class modules. The Mitsubishi modules are constructed in black epoxy and cannot be modified as they are completely sealed, unlike the Fujitsu surplus module. They run from 12 volts directly and do not require minus bias supplies.

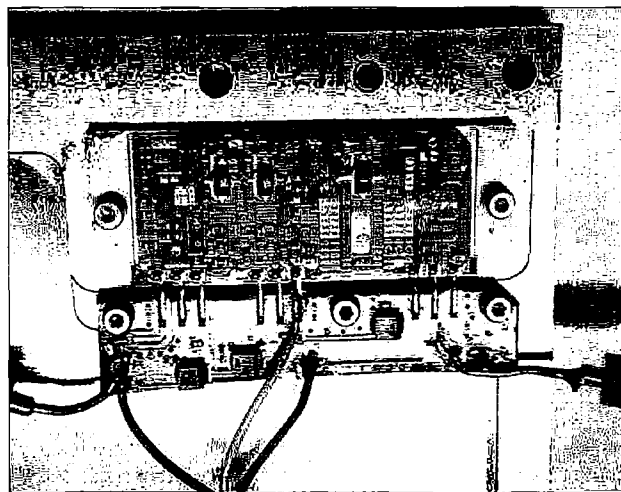
Comparing the Mitsubishi modules and the Fujitsu module, they are quite similar except that the Fujitsu module has a removable metal cover. It can be gently lifted off to expose the circuitry of the amplifier PC board, allowing modification to the internal circuitry to make it useful at 1296 MHz. Modification details are shown in **Photo A**. The Mitsubishi modules are sealed in a black plastic epoxy case with two heat sink fins on either side and five connection leads protruding from the module case. No hint of circuitry is apparent in the black modules. The cost of the Mitsubishi modules is a little expensive, slightly over \$60 last time I checked. A fine module but costly.

Power output is rated for +39 dBm using both the +7 and +9 volt power supplies. That's 1 dB under 10 watts power output when the final device is run from a +9 volt power supply.

The circuit board is obtained from cutting the power amp module and its bypass capacitors out of the larger main circuit board. Originally, the amp is set up to run from a single +7 volts power supply. This produces originally about +36 to +37 dBm power output (5 watts is +37 dBm) at 1616 MHz. Power falls off quite rapidly as frequency is lowered out of its normal frequency range of operation. That's where changing circuit elements comes into place to increase performance at 1296 MHz. Fortunately the module is not sealed and the cover can be pried open and the required simple changes made to allow operation at 1296 MHz.

The plan was to see what could be done to modify the Fujitsu modules to 1296 MHz operation. My partner Kerry N6IZW figured out the values needed to convert the Fujitsu 1616 power module. The changes are easy. What is required is to increase four chip capacitor values to increase performance in the 1296 MHz band. The values selected are nearly correct (not optimized) and were selected because they were obtainable from our junk box. Other values varying 10 percent or so should work just as well as the values we selected. One 1.5 pF chip cap and two each 3 pF chips caps and a single 6.8 pF chip cap did the trick. **Fig. 1** shows the location where to place the additional chip caps on top of the existing chip caps on the power amplifier board.

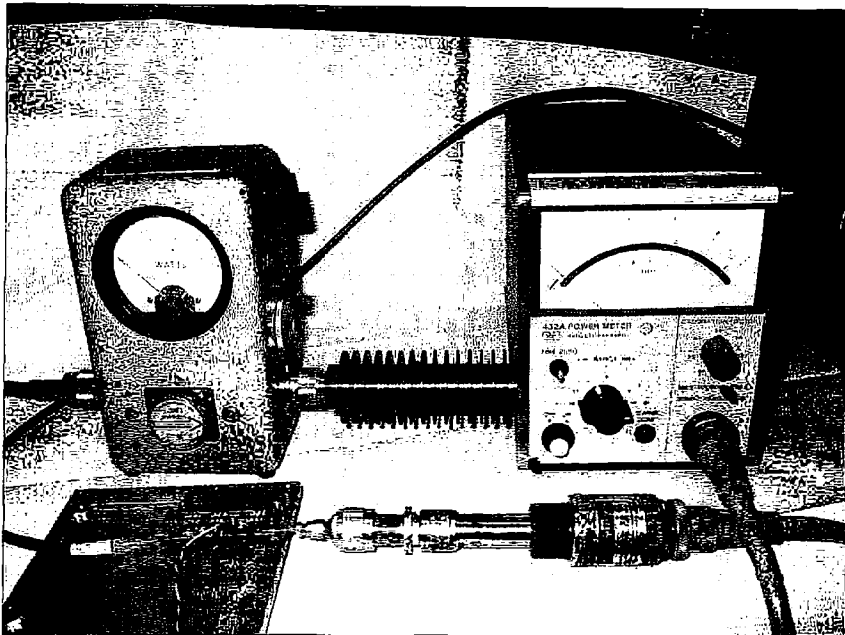
As shown in the drawing, there are three amplifier devices surrounded with a couple of chip caps marked "C". The four capacitors to be increased in value are shown with



**Photo A.** A picture of the internal workings of a Fujitsu FMC1616L1015 power amplifier for the 1600 MHz satellite telephone service. Like most power modules that are sealed, this device has a cover that can be pried open and modified. Please note that there are four chip capacitors. This is where additional 0.05-inch chip capacitors will be mounted piggyback on top of the existing chip capacitor on the PC board amplifier to lower frequency of operation.

When the Fujitsu modules were located in surplus and the details on their performance capabilities were realized, we knew a conversion to 1296 MHz was going to be attempted. Looking at the Fujitsu FMC 1616L1015 specification will show you the interest we had when its ratings were obtained. Its main frequency of operation is centered on about 1616 MHz and was intended for use in the Globalstar fixed telephone system. The PA requires +9 volts @ 2.5 amps, +7 volts @ 1 amp and -4 volts bias.





**Photo B.** Test bench devices used for testing the amplifier include RF sweeper (not shown) for RF drive. For measurements I use both a Bird 43 power meter for coarse work and a HP432 power meter for more exact results. I like to use the Bird 43 RF power measurements and the HP432 and suitable attenuators to do the final exacting measurements.

a circle drawn around them individually. Other nearby chip caps are shown to provide a layout perspective of the board's component parts. Resistors and other circuitry were not shown — just the major chip capacitors to reduce confusion and give a perspective of the board layout as to which chip capacitors to increase in value. We used a small, miniature, 0.05-inch chip cap to

modify the amplifier. If larger capacitors are used, the necessary amplifier cover might short them out to the cover, which is ground when cover is reattached. We will supply the necessary chip caps with the amplifier PC board obtainable from the author.

### Instructions

Installing the chip caps can be dangerous,

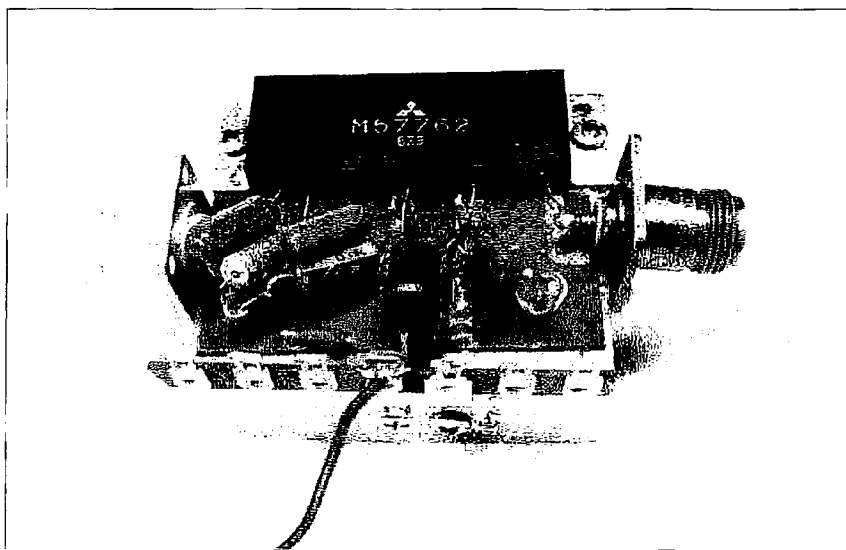
especially if you drop the chip caps on the floor or in a rug. A familiar problem comes when you grab them with a pair of tweezers: if you pinch them too greatly, twang, the chip cap flies off to never-never land. Best to work with good lighting on a sheet of paper or something to give you contrast to the white chip cap, and work with only one at a time. Locate the first capacitor to receive a piggyback chip cap. Add a small dot of solder to one end of this chip cap on the PC board. This is to facilitate receiving the new capacitor on top of the target chip cap. The solder dot added to the cap will be enough to tack solder in place one end of the modification capacitor.

I use a small surgical tweezers to hold and position the chip cap in proper place and then just touch solder the chip cap's one end to the bottom chip cap. Examine position, and if all is OK, solder the other end of the chip caps together. Resolder the first end over again to make it a good connection and do not leave any solder spikes to short out when the cover is placed back on. Additionally, the new chip cap should lie as flat on top of the existing chip cap as is possible for cover clearance. Repeat the procedure for the remaining three chip capacitors to be so modified.

DC power leads need be nothing more than standard stranded hookup wire. I found a short section of stranded 20-gauge wire that must have had 50 different color conductors. Striping the insulation cover produced several different colored wires: black, red, green, blue, yellow, to mention a few. I purchased a 5- to 10-foot section of the cable and cut it up into 1- and 2-foot sections for a wire junk box. It's proven to be quite handy. When I need bias I pull yellow, ground black and +DC red, or whatever color needed to run simple wiring needs. It's worked out well over the years. I'm still working on the 5- or 10-foot section I stripped down to the wire box.

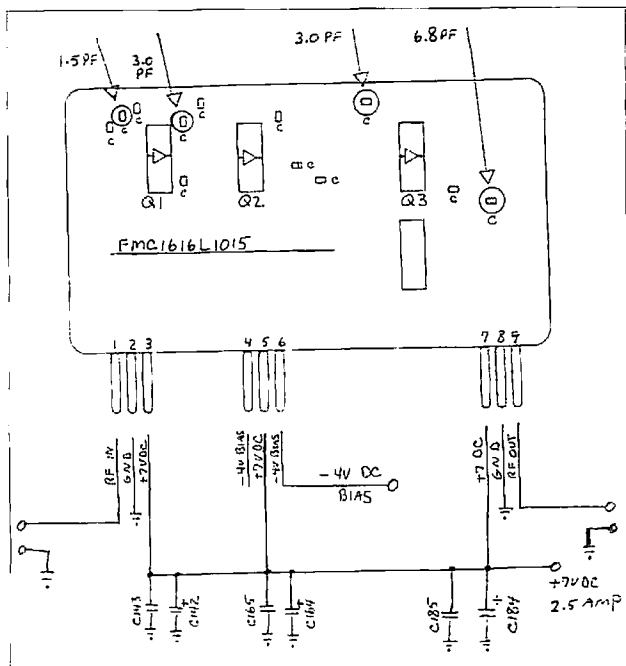
For coax connections, look for small diameter microwave-rated shielded coax with a connector you normally use, like an SMA male or female connector, attached to one end. It's good material to add to your junk wire box, be it hard coax line like .141 solid copper jacket or its smaller brothers the .085 and .041 hard line. It all has its uses and will be used on a project sooner or later. The .141 solid jacket coax is a little hard to form to my needs but the smaller variety (.085 and especially the .041) bend and form to fit quite well for circuit modifications, especially in tight soldering spots.

Don't use RG-174 miniature coax, as it tends to be too lossy and the soft insulation



**Photo C.** Mitsubishi M57762 5-watt commercial 1296 MHz amateur band amplifier. Note the large-style components used in this older amplifier. This unit is sealed in black epoxy unlike the Fujitsu Module. A rebuild using chip electrolytic and bypass capacitors is in order. After some 8 years, this workhorse module still functions.





**Fig. 1.** The internal circuitry of the Fujitsu power amp's three-amplifier stages. Shown in detail on the drawing are the chip capacitors noted as "C" and the three power amplifier devices. The four chip capacitors with circles around them are the chip capacitors that need additional capacitance to lower the frequency of operation into the 1296 MHz amateur band. I used 0.05-inch-size chip caps in this conversion. The more common surface mount chips caps are too large to mount on top of the existing circuit's capacitors.

is apt to burn while you are soldering. Teflon coax of nearly the same dimensions as RG-174 works out well and stands up to soldering

conversion is not difficult. Main power supply requirements at a minimum of about 3 amps at 7 volts is necessary to give some

abuses. It's kind of hard to melt Teflon or short out a miniature coax connection when Teflon insulation is used. Keep an eye out at swap meets for short sections of Teflon miniature cable with an SMA connector on one end. I will bet the material can be picked up for very little cost. Then cut it to the length required, and you do not need to go through the time-consuming processes of attaching an SMA connector to a short section of coax. It's already done. A great junk box item that not only saves time but money as well.

### Testing the converted power module

The test and evaluation of your conversion is not difficult. Main power supply requirements at a minimum of about 3 amps at 7 volts is necessary to give some comfort level lest you get false readings from a power supply that is folding back in voltage as it cannot deliver 3 amps of current for the positive supply. Power connection for the single +7 volt supply can be made to any of the electrolytic capacitor positive trace on the PC board, as all + DC pins are tied common on the board. The -4 volt bias pins (pin 4 and 6) are tied common internal to the amp chip and only one pin need be wired out for -4 volt bias control. I made

my connection to pin #6 for -4 volts bias. The metal heat sink is cut out slightly larger than the amplifier, allowing bolting the metal frame to a larger surface heat sink such as the metal plate of a cabinet.

I suggest keeping the top section of the original heat sink just above the cover plate of the amplifier, where there are three holes in the original heat sink plate. These holes can be used to firmly attach to a bottom metal plate for good heat sink transfer of heat. Use some heat sink grease to maximize heat transfer. A little bit will do the trick.

### Testing

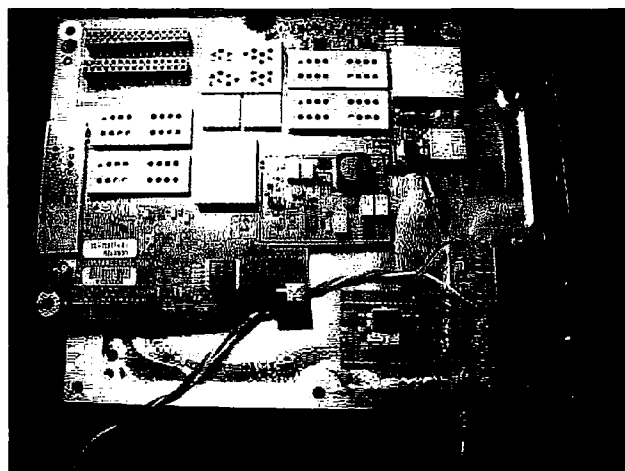
For workbench test connections, apply -4 volts bias first, then apply the +7 volts DC. Watch current readings on the +7 volt supply — it can be an amp or more. Then, if all is still well, apply RF at 1296 MHz. RF drive from my HP-8620 Sweeper will provide about +17 dBm, which is overdrive. Reducing drive to something in the +5 to +10 dBm range is more normal for actual simulated drive conditions. With +10 drive idle current of the amplifier was in the 1.5 amp region and with RF drive applied RF output power went to +36.5 dBm, just about 5 watts of power. Current increased from 1.5 amps to just over 2.5 amps at full RF output of 5 watts.

I had to try the mod to provide +9 volts to just the final stage #3 amplifier with +7 volts going to the first two stages, bias remains at -4 volts. I was in a hurry so I just tried to kick the tail of the dragon and see what happens. I disconnected the +DC voltage and raised the power supply to +8 volts and applied power and received +38.2 dBm output at 1296 MHz. I did not want to leave overvoltage on stages 1 and 2 so I shut down the power supply before I damaged the unit. Maybe next time I will build up a power supply from +9 volts and +7 volts for stages 1 and 2. And give it a go. But for now 5 watts is plenty for my 1296 MHz FM/SSB station that is all home-brew. I am satisfied with its basic operation, as I do not want to stress things to their maximum limits.

### Technical help

As with all our projects we will be glad to answer questions on this and other related items. Our goal is to show you how to interface and change circuits, be it this amplifier or some other device you have. This is just a concept on how to use material for

*Continued on page 61*



**Photo D.** This is the original PC board from which the high power amplifier is cut. The smaller PC postage stamp board shown is a 1600 MHz filter that can be converted to a 1296 MHz filter. For details look on the Web at [http://www.ham-radio.com/sbms/sd]. Look under technical papers from the SDMG 1296 MHz transceiver for expanded details on this 1296 MHz system and filter details.



# Emergency HF Operations

*With every challenge there is, by definition, an opportunity. With recent events, what are the opportunities that present themselves to the amateur radio community?*

Although this column focuses on three different areas, mobile — portable, and emergency communications — to a great degree they tend to intertwine. The ability to provide communications to support a community effort, whether it is a routine event like a parade or “fun run,” or a disaster, requires that we set up communications in a manner that supports the event. In some cases, this means that some or all of the radio operators will be at the scene, and if so, the ability to set up a station in an unexpected location on short notice will be critical. We tend to assume that the focus will be on short range communications, and this can often be quickly and easily done by use of UHF and VHF equipment.

However, amateur radio may no longer be the primary method to provide short range communications during a disaster. Public service radios are becoming more flexible and even the cell system has made major advances. It is safe to assume that eventually these systems will increase in

reliability to the point where they will continue to operate to full expectation even under the worst of conditions. What will amateur radio’s role be when that happens? If we are going to continue to be an important asset, we need to be able to provide other appropriate services.

Let’s create a generic emergency, add a couple of assumptions and see what opportunities exist. First, let’s assume that regular power is not reliably available. Second, assume short range communications are being adequately addressed. There may even be some local telephone service. What services might be required that we can offer?

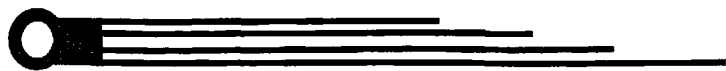
This scenario is within the realm of possibility. There are various traditional scenarios that involve the loss of a major switching point for the long distance lines, such as an earthquake along the New Madrid fault in Missouri. Of course, a terrorist attack could accomplish the same thing, and would be a significant event. Even worse, this could be accomplished not only

by a physical attack on the facilities, but potentially by hacking into the control computers while the terrorists sit safely in some far off land. This type of incident could equally affect the Internet either by direct attack or by the Net being impacted as millions of people try to access it (as occurred during the attacks on September 11, 2001). If so, we might be called upon to provide long range communications. In case we are called upon, we must be thinking of ways in which we could provide for the accurate and rapid handling of a significant amount of message traffic.

If we are going to meet this need, we will need to think through how we would do so. Perhaps the biggest challenge is the need to assemble the equipment. While it may be easy to grab the handie-talkie and head out on a moment’s notice, it will be a little more difficult to rapidly assemble a station to work effectively on HF. In most cases, the equipment that is used for regular ham operations will have to be disconnected and transported to the emergency support location. In some respects this parallels what happens on Field Day or for a special event station, but in those cases there is time to plan and discuss how everything is going to be handled. For Field Day, we may know that Bob will bring his all-mode HF rig this year because Bill will be out of town. Unfortunately, when a disaster strikes there is precious little time to begin the planning process. Instead, we should plan now for what might be needed. I’d recommend that your club or group develop a plan with who brings what, and then reviews that plan at least once a year — perhaps as a regular meeting topic. Here are some of the things that need to be discussed now so that there can be a rapid response in the future.

1. HF rig — While there are some great QRP rigs available, in disaster support you will want to have a full-featured rig with a

### Wire Lug



Multi-Conductor Rotor Wire

Use shrink tubing at  
end of wire

Suggested lengths: (Calculated as  $234/\text{frequency in MHz}$ )

80 Meter Radial: for 3.93 MHz 59' 6"

40 Meter Radial: for 7.26 MHz 32' 3"

20 Meter Radial: for 14.29 MHz 16' 5"

10 Meter Radial: for 29.1 MHz 8' 5"

**Fig. 1.** If you plan on using a vertical for portable HF operations, you should plan on using radials. These can be made in advance from multiconductor rotor cable with each wire cut to a different band. Plan on three or four radials that can be coiled up until needed.



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## Say You Saw It In 73!

reasonable amount of power. In most cases, this will mean about 100 watts — enough power to be heard while able to be used with most easily assembled antennas. It should at least offer both upper and lower sideband, and be capable of running digital modes at a high duty cycle. Dual VFOs would be good as would expanded coverage for Military Affiliate Radio Service (MARS) and Civil Air Patrol (CAP) frequencies. If the rig can tune 10, 15, 20, 40, and 80 meters for the ham bands you will have good coverage for most propagation conditions.

2. Required ancillary equipment — I recommend two microphones and headsets and an extra power cord as well as extra fuses. You will also need a power supply for operating from AC line power when available,

as well as an alternative power source such as a deep cycle battery. If you use a battery, it will need some means for recharging. This could be a sophisticated power source such as a solar panel, or something as simple as jumper cables, to allow you to periodically refresh the battery by connecting it to an automobile.

3. Antenna — Something versatile and quick to assemble. Possibilities include a random-length long wire. Used with an antenna tuner this can be very flexible. Two insulators, a spool of insulated wire and some rope and you can at least get on the air. The only coax required is enough to connect the transceiver to the antenna tuner. You'll need some type of ground and a way to connect to the ground. You may prefer a dipole of some type, and they can also be easy to erect. If you have any type of wire antenna, the antenna can be coiled and stored in a large plastic bucket with a snap-on lid. Usually there will be room for the antenna and any auxiliary items. For any type of wire antenna, you'll need some method for getting the antenna up above ground level. A large ball of string and a weight that can be thrown or launched by a slingshot will be essential if there are suitable supports in the area.

I've seen verticals used effectively in a rapid deployment situation. Generally it is best to have a vertical that is designated to be used for emergency situations rather than

trying to disassemble your home antenna. If you plan on using a vertical, here are a few hints:

(a) Long before you expect to need it, set the vertical up and tune it, then break it down into three or four foot lengths. When you disassemble it, mark where one tube fits into the other with magic marker so you can slide the pieces back together to the correct lengths. Tape the disassembled sections together along with the correct-size wrenches and screwdrivers needed to reassemble the antenna.

(b) Make radials that can be quickly and easily deployed. I use multiconductor wire such as the type used for antenna rotors. You can trim one conductor for your preferred segment of the 80-meter band, the next for the 40-meter band and so on. By having the radials available, you can set this antenna up at ground level or on a roof top. (See Fig. 1.)

(c) Some means of erecting the antenna. For ground mounting into soil you'll need a length of the appropriate-diameter pipe and a sledge hammer. For any other location, a sturdy base and rope for guy wires. Plastic tent pegs are good for securing guys into soil. On a rooftop or parking lot, sandbags or buckets filled with water or dirt can do the trick. (See Fig. 2.)

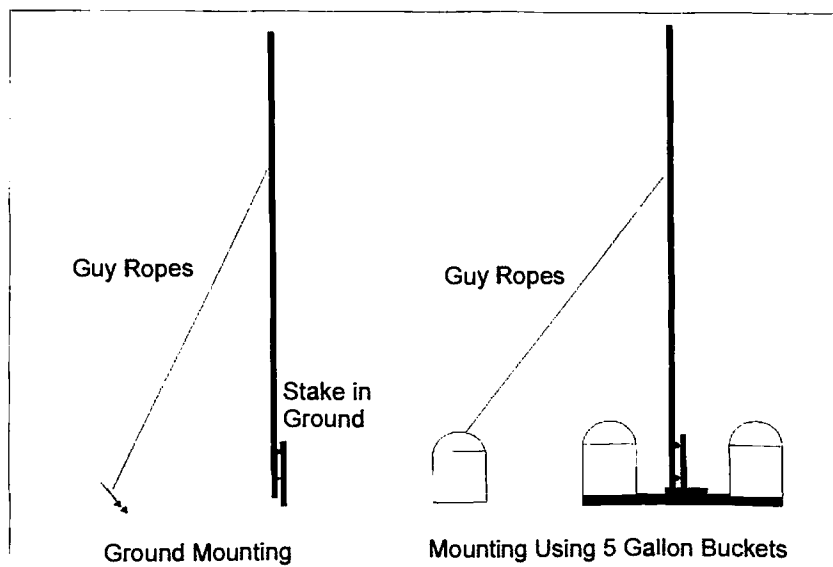
(d) I would recommend bringing an antenna tuner along if possible. An antenna perfectly tuned back home will not necessarily exhibit the same characteristics when installed somewhere else. The antenna tuner may help you avoid damaging your rig.

(e) And finally, don't forget to bring along plenty of coax.

4. Recommended accessories — I would strongly recommend a TNC and a laptop with software to run PACTOR. This would provide compatibility with MARS as well as a way of sending text messages that would not be copied by the casual listener. An old laptop can be used as a terminal, but I would figure some way to bypass the internal battery and run it from gel cells. Those of us who travel with a laptop know how unreliable the internal battery is.

I'd strongly suggest some redundancy. I'd much rather have one rig up and running and two others locked in trunks in the parking lot than have only one rig that might fail. And all of these ideas are in addition to the usual grab-and-go materials, including pens, paper, clipboards, extra clothing, snacks, small tool kit, etc.

Next time, I'll be discussing operating options at the scene. In the meantime, let me know what you think is essential for emergency HF operations.



**Fig. 2.** A vertical antenna can be readily mounted in several ways. On the left, the radial is mounted to a post driven into the ground and guyed with ropes attached to plastic tent pegs. On the right, the antenna is mounted to a post attached to a flange on a sheet of heavy plywood. Five gallon buckets filled with water or sand are placed on the plywood and anchor the ends of the guy ropes. Empty buckets are easier to transport and the weight can be added at the site.



## ECHO and EAGLE

*AMSAT-NA, The Radio Amateur Satellite Corporation of North America, has two major near- and long-term projects mapped out for the future; AMSAT-OSCAR-ECHO and EAGLE. Both are ambitious, but neither will be of the magnitude of the AMSAT-OSCAR-40 program.*

In mid-January, the AMSAT Board of Directors held a teleconference to discuss an opportunity to build a new low-earth-orbit microsat. Subsequent meetings and discussions in February and April have gelled into a plan for a complex microsat to be ready for launch late next year.

Why ECHO? On March 5, 1978, AMSAT-OSCAR-8 achieved orbit riding a two-stage Delta 2910 launcher from the NASA Western Test Range in Lompoc, California. Prior to launch, this hamsat was known as AMSAT-OSCAR-D, or just AO-D. It was the fourth AMSAT satellite project. AMSAT has been involved with a number of satellites since then. AMSAT president Robin Haighton VE3FRH has announced a return to the original sequential project designators for the new AMSAT project; thus AMSAT-OSCAR-ECHO, AO-E, or just ECHO.

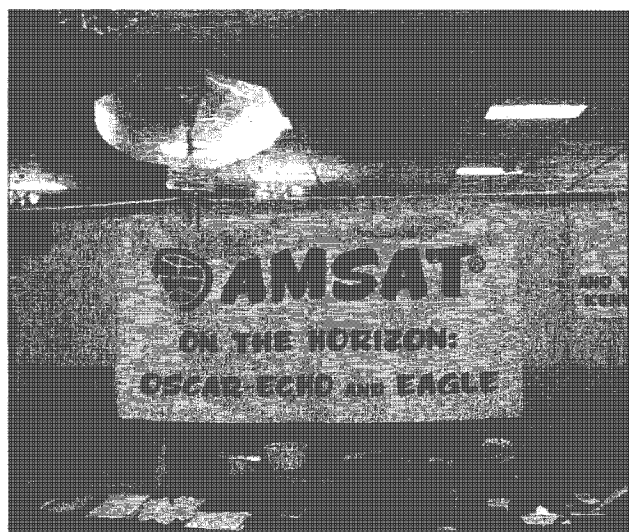
The original microsats, AMSAT-OSCAR-16, Dove-OSCAR-17, WeberSat-OSCAR-18, and LUSAT-OSCAR-19, were launched together on January 22, 1990, as secondary payloads on an Ariane rocket. These small satellites are cubes about 10 inches on a side and weigh about 18 pounds each. The basic design was excellent, and other satellites like ITAMSAT-OSCAR-26, AMRAD-OSCAR-17, Mexico-OSCAR-30 and SAUDISAT-OSCAR-41 are variations and improvements on the originals.

SpaceQuest, of Fairfax, Virginia, has been using the microsat format for a number of years, and has been a participant in a number of microsat-based programs like AO-27. SpaceQuest is to provide the basic satellite bus for ECHO and some of the subsystems. Thanks to advances in electronics, more functionality can be built into ECHO, while still keeping it small. Solar cell efficiency

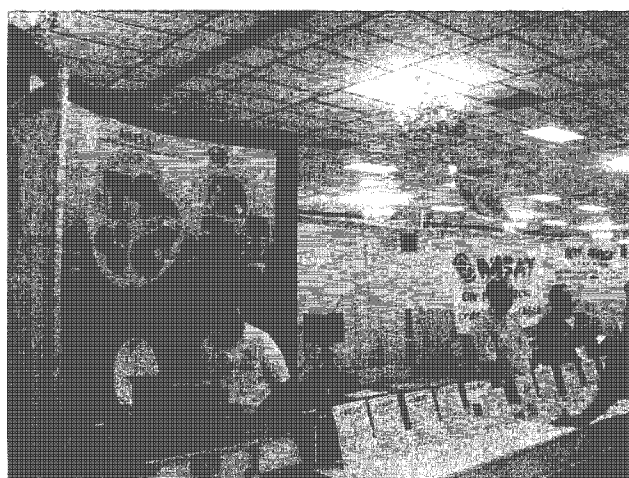
and battery capacity are also up in the last decade, so more power will be available for the experiments and radio gear.

ECHO is to have five internal trays and weigh about 22 pounds. The size should be like that of the original microsats, about 10 inches on a side. Receivers include four VHF units, a multiband, multimode system, a low-frequency receiver, and an L-band digital receiver. Transmitters include two UHF units with a true circular-polarization antenna and an S-band digital system. The digital capability is to include ADCARS (Advanced Data Communications for Amateur Radio Service). Other onboard systems are to include full telemetry, GPS (Global Positioning System) receivers, APRS (Automatic Packet Reporting System) capability, and an active magnetic orientation system.

The cost of ECHO to AMSAT has been

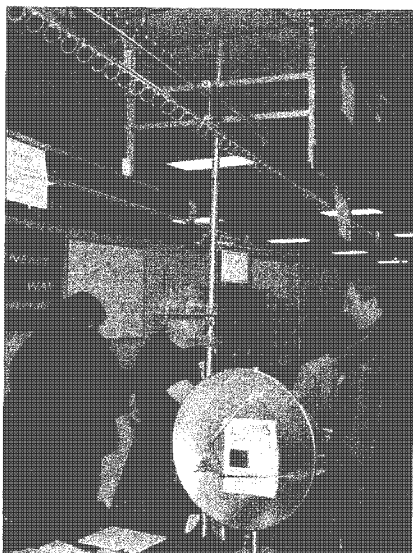


**Photo A.** The AMSAT booth at the Dayton 2002 Hamvention. (NSEM photo)

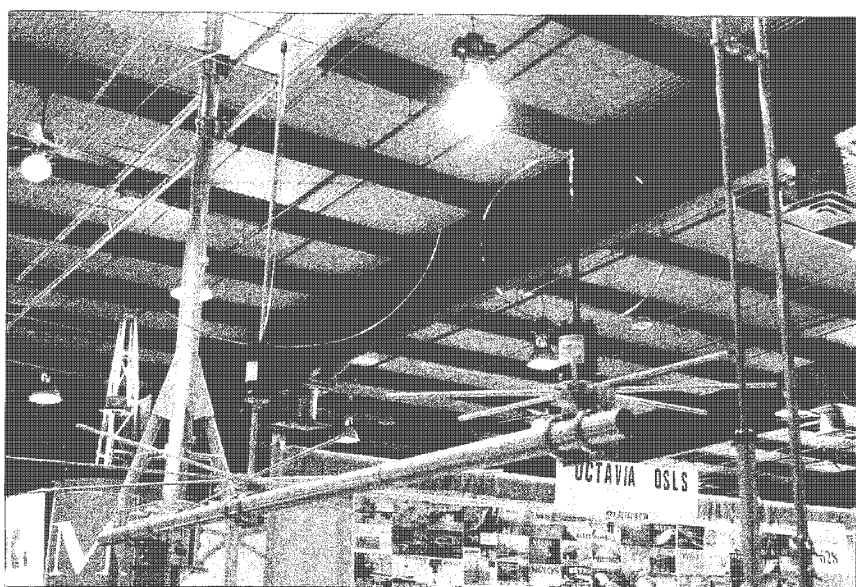


**Photo B.** Another view of the AMSAT booth at Dayton. Note the full-size engineering model of ECHO in the lower left just in front of Frank Bauer KA3HDO. A model of PCSat (N-O-44) is also on display. (NSEM photo)





**Photo C.** Downeast Microwave had plenty of antennas and microwave gear at the Dayton event. (N5EM photo)



**Photo D.** Many hams are quite familiar with the satellite antennas manufactured by M-Squared. (N5EM photo)

estimated at \$200,000. Although this is small compared to the cost of AO-40, it is still significant, and will require support from the amateur community and AMSAT membership. Full technical details about ECHO are available in an article by Rick Hambly W2GPS in the May-June issue of *The AMSAT Journal*. The *Journal* is included in AMSAT membership. To join AMSAT, call toll free 1-888-322-6728 or write to: AMSAT, 850 Sligo Ave., Silver Spring MD 20910.

## EAGLE

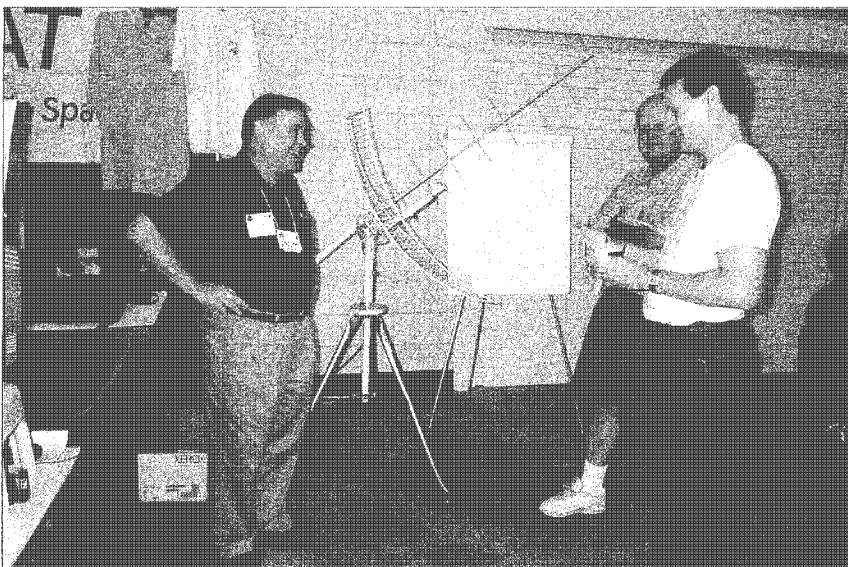
AMSAT's longer-term and even more

ambitious project is called EAGLE. Originally this satellite was expected to weigh in at over 200 pounds and cost about \$600,000, not including launch. The cost has not changed, but once again, due to advances in technology, the designers feel that the mass can be reduced. The weight is now expected to be just over 100 pounds. The orbit is expected to be elliptical and similar to that of AO-40, but with a lower apogee (orbital high point).

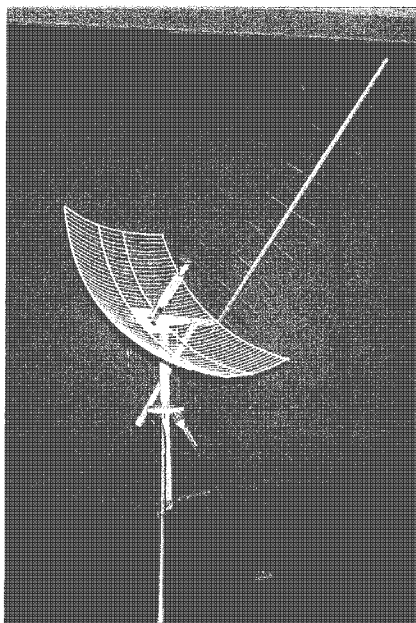
Digital voice and computer experiments on ECHO are expected to provide valuable experience for the design of EAGLE. The design phase of EAGLE should be complete

in late 2003, with full integration done in 2005. AMSAT is currently searching for a launch opportunity in 2006. The new size and weight parameters for the spacecraft may allow AMSAT to look beyond the usual Ariane launcher to get EAGLE into orbit.

While not all of the experiments and systems for EAGLE have been decided, some basic



**Photo E.** Roger Ley WA9PZL and Doug Howard KG5OA discuss satellites at the AMSAT booth during the Arlington, Texas, Ham-Com 2002.



**Photo F.** A better view of the complete, fully functional AO-40 ground-station antenna system on display and used at Ham-Com 2002 for demonstrations. The system has a linear yagi for the 70-cm uplink and a BBQ-grill semidish with modified commercial downconverter for 13-cm receive.



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*Photo G. My first satellite contact with Pitcairn Island was in 1992, but I had worked Tom Christian VR6TC on 20 meters 21 years earlier. It was great to meet Tom and Sheri Christian in person at the Arlington, Texas, Ham-Com 2002.*

parts include transponders using two meters, 70 cm, 23 cm, and 13 cm. A simple kick motor will also be needed to boost the perigee (orbital low point) after release from the launcher, and to allow ground controllers to actively deorbit the satellite when it is near its end of life. EAGLE promises to be an exciting follow-on to AO-40 as a high-altitude DX satellite.

### AMSAT at the shows

AMSAT has been working hard to promote the ECHO and EAGLE projects for the future of amateur radio in space, and also to demonstrate how easy it is to use AO-40 today. The complexity of a fully functional AO-40 station is barely more than that of a station used for AO-10. In fact, due to the much smaller size of the required antennas, demonstrations have been much easier for AMSAT Area Coordinators and other volunteers. AMSAT had small systems on display at their booth at the Dayton, Ohio, Hamvention, and just a month later at the Arlington, Texas, Ham-Com 2002.

A complete antenna system for AO-40 can be easily mounted on a tripod. For 70 cm, a 10-element linear yagi will do the job with a short run of quality coax back to a 50-watt, all-mode transmitter. On the 2.4 GHz (13 cm) downlink, a BBQ-grill-style semidish with a converted commercial MMDS downconverter, coupled

through some reasonable-quality RG-59 to a two-meter, all-mode receiver is all that is needed for quality reception. Bob K5GNA sold hundreds of plug-and-play antenna/converter packages at Dayton and Arlington.

Don't let microwave phobias keep you off AO-40. It's never been easier. ICOM even markets a 2.4 GHz downconverter to work with their radios that are capable of all-mode VHF reception. For the experimenter, there are plenty of things that can be done to optimize an already-functional system. Improvements include circular polarization on the uplink and downlink, a preamp, screening the BBQ-grill antenna, better cable, and more on-the-air practice.

### AMSAT on-line

While the AMSAT Web site [<http://www.amsat.org>] has always been a great source of information, it has not been able to provide an on-line store for books, software, hardware, CDs, and trinkets. That's changed. In addition to the "1-800" number for orders and memberships (1-888-322-6728), AMSAT now has on-line ordering capability. You can securely use your MasterCard or VISA to place an order for just one or several items that AMSAT has available. You can get there via the usual AMSAT site noted above, or go directly to [<http://www.amsat-na.org/s-cart/>].



## More Macros for You

*A few months back, I wrote about using macros for rig control with the MixW 2 program. There is a growing interest in controlling rigs from the keyboard these days. To the casual observer/ham, it appeared, for a time, that the rigs such as the Ten-Tec Pegasus had a lock on this sort of control and that would be the rig of choice for remote control.*

Other manufacturers have been making rig control available for quite a few years. Even my old IC-735, now obsolete, had a fair amount of control available if you had the correct software and a little patience to get it to perform. Don't let me leave out Kenwood, Yaesu, and a little surprise package — the Elecraft K2 can also sit up and do its own bag of tricks. I don't own or have access to any of these latter rigs, but hams are controlling them quite well.

The important part of controlling the rig from the keyboard is having the control work in conjunction with the other software you are using at the same time. A number of rig control programs have been written which do nothing other than take over the control of the rig, but what most of us appreciate is recording of frequency and mode for logging purposes. A real plus is when the rig control is implemented within a communications program, then we can peak the signal copy by whatever means is available in the rig while continuing the QSO.

### Zakanaka-Logger macros

I have had the idea for a while to see what was possible using the Zakanaka and Logger combo for rig control and, as I read the Zakanaka Help file, I realized why there is a group of really devoted users of this software. It does just about everything if you set it up for your personal preferences.

Most of us have personal preferences and you will find the macro commands in the various software packages are dictated first by the desires of the program author. Each of us is an individual.

After working with various programs over the air, I have found a number of macros that are very helpful. Other than the most necessary "CQ" and "Answer CQ" along

with other QSO shortcuts, I like to be able to change frequency, mode, band, and filter without fussing with the knobs on the rig.

My first request on the list for automated frequency selection looked as though it could get difficult until I read the Macro Help File in Zakanaka. I realized, after a few minutes' consideration, there are relatively few frequencies that I regularly switch to when working digital modes.

This made it a little easier, so I experimented a bit and found that if I wished to check the PSK activity on 10, 15, and 20 meters quickly, I could simply program a macro button for individual frequencies and the rig (Icom 756PRO) would go directly to the frequency. So I wrote QSY macros for the three bands — such as \$qsy28120.0\$ for 10 meters — and named that one 10M PSK. Switch between these macros in moments, check the waterfall for activity, and take appropriate steps to make contact.

This might seem that you would set aside a lot of macros, but again, the popular frequencies can be covered easily, especially when you consider there are 36 macros available for PSK and another 36 for RITY.

My next item in the wish box was the filter selections. This was only slightly more problematic. One Filter command already existed on a button labeled "HEXCOM" (I think). I edited it for the rig at hand and gave it a try, and something was amiss — the program locked up. I had to go into thinking mode. It didn't look as though I had done anything incorrectly.

The problem surprised me. Somehow, whoever had written that macro inserted a colon between the macro command \$hexcommand\$ and the hexadecimal string that followed. I changed it to \$hexcommand fe 5c e0 06 01 01 fd\$ and the macro took

off and selected the filter designated as "filter 1" in the PRO.

From there, I was able to quickly write two additional macros to select the remaining defined filters in the PRO. These hexadecimal strings are applicable to the Icom and make it possible for you to select not only filters, but USB and LSB and any of the other controls selectable according to the commands for your particular rig.

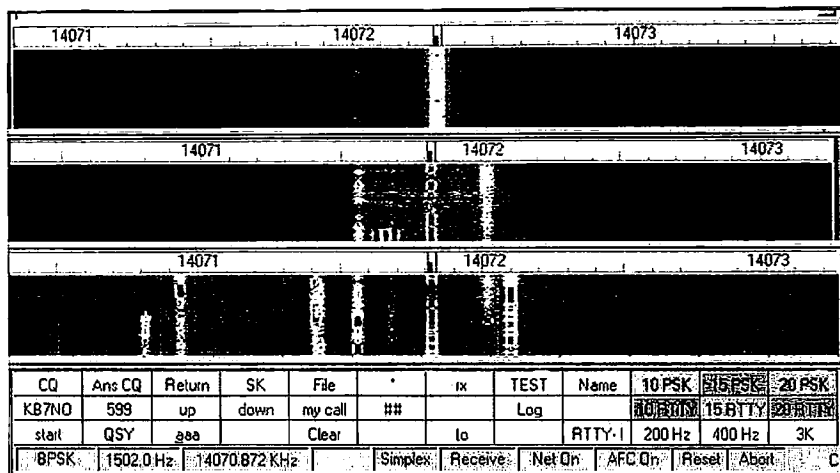
I found the information supplied with the rig was a little hard to follow, but there is a great Web site for Icom rig control at [<http://www.plicht.de/ekki/civ/>]. This is an excellent site to scan for other commands for your rig, and it explains the order of those strings. Yes, there is a rhyme and a reason to it all. One of these days, I will happen on similar information for other brands. I know it is out there somewhere.

As I mentioned, I had written some similar macros for the MixW 2 software, so naturally I wanted to have the same result from these macros. This did prove a small challenge, but if I can do it, it cannot be too hard.

One of the macros that comes with Zakanaka uses the "align" command. The off-the-shelf macro when you load the program has \$align\$ written in it three times. I am not sure of the necessity of the repetition, but I decided if that was what the program author found worked best, there would be no argument here, so where you see that in the macros I have written, that is the reason.

Speaking of aligning the signal within the center of the filters, I found that originally the filter was not centered as I had them defined. The simple fix for that in the case of the PRO is simply to adjust the passband filter skirts to fit. They stay at that setting





**Fig. 1. Screenshot.** This is a composite demonstrating the effects of the 3 filters as they progress from wide at the bottom to narrow in the top waterfall. At the bottom are the 36 macro keys. The right group of 9 have been given colors. They are the new macros written as described in the text. The Zakanaka-Logger programs are an excellent vehicle to pass along rig control. There are 36 macro buttons showing, plus another 36 display when in the RTTY mode. The new macros make it possible to switch modes and frequencies with one click or Hot-key. The filter macros enable you to choose the filter and center it on your signal with a single click also. Good filters that are easily activated can save the day on a QSO during marginal conditions. Most modern rigs can be controlled from programs such as these and the operating chore becomes an operating pleasure.

when you turn the rig off and on again, so that was simpler than hunting for a way to adjust the align frequency.

Just as a little aside about using filters with these soundcard modes that already have a DSP built into them; there are times when the band is crowded, or when there is just one really strong signal nearby that ruins your copy. A filter can save the day for you, especially if it is easily activated.

But you still have to be the operator and remember to do it. A few weeks ago I was working a ham on PSK who was running two watts and he was pretty good copy except when the other signals started to crowd him, then the print would deteriorate badly. This was one of my less alert days and it took me a few go-arounds to "get the picture" and recall what I had those filters in there for. I activated the filter and we probably communicated almost flawlessly for another fifteen minutes. It works.

### The macros

As you look at the screenshot, you will see there are three rows of macros totaling 36 macros in all. This is only the PSK group of macros. There are another 36 programmable buttons displayed when you switch to RTTY.

I wrote nine macros for this exercise, as follows:

10 PSK (button label)

\$qsy28120.0\$

\$bpsk\$

\$hexcommand fe fe 5c e0 06 01 01 fd\$

The first line changes the frequency. The second line, the mode. The third line selects the wide filter. It is best to go with the wide filter command in case you were using a narrow filter previously. It saves another click. You are ready to see what is there.

15 PSK (button label)

\$qsy21069.5\$

\$bpsk\$

\$hexcommand fe fe 5c e0 06 01 01 fd\$

Same reasoning as for the 10-meter macro, except for the frequency.

20 PSK

\$qsy14069.5\$

\$bpsk\$

\$hexcommand fe fe 5c e0 06 01 01 fd\$

Again, only the frequency change.

10 RTTY

\$qsy28080.0\$

\$rtty-i\$

\$hexcommand fe fe 5c e0 06 01 01 fd\$

In addition to the frequency change, the mode change is to RTTY inverted so you can leave the rig in USB for both modes as you go back and forth.

15 RTTY

\$qsy21080.0\$

\$rtty-i\$

\$hexcommand fe fe 5c e0 06 01 01 fd\$

Just the frequency difference here.

20 RTTY

\$qsy14080.0\$

\$rtty-i\$

\$hexcommand fe fe 5c e0 06 01 01 fd\$

Again, only the frequency change.

200 Hz

\$align\$\$align\$\$align\$

\$hexcommand fe fe 5c E0 06 01 03 FDS

The first line brings the selected trace to the center of the waterfall. The second line selects the narrow filter which on the PRO is designated 100 Hz, but it is not really that narrow. With a little tweaking I can get good copy on a RTTY signal with this filter setting, but recommend the 400 Hz for RTTY. Incidentally, the filter command is the last command in the string before "FD."

400Hz

\$align\$\$align\$\$align\$

\$hexcommand fe fe 5c e0 06 01 02 fd\$

The only difference here is the "02" filter selection.

3K

\$hexcommand fe fe 5c e0 06 01 01 fd\$

Life gets a little easier when we are not aligning anything. This is the wide filter, set at your preference on the rig, and gives the full view of the waterfall.

There is a moment of panic you may experience when you first click a RTTY macro and your nice shiny new PSK macro buttons disappear from view because only the

*Continued on page 61*



## USA ARDF Championships in Georgia — Part 2

*Q: What's better than southern hospitality? A: Southern ham radio hospitality! When you get together with hidden transmitter hunters and orienteers in the Peachtree State, get ready for a great time and a serious challenge.*

Pine Mountain, a community of about a thousand souls, is an hour's drive south of Atlanta. When it was chartered in 1882 as a railroad stop, the founders named it Chipley. Then in 1952, Cason Callaway opened his gardens to the public. Slowly they grew to today's 14,000-acre resort with nature trails, butterfly center, birds of prey show, and much more. Four years later, the city fathers renamed the town Pine Mountain. Now it's a magnet for tourists from around the country who come for the gardens plus golf, fishing, hiking, biking and now — radio-orienteering.

There's no McDonald's or Burger King

in Pine Mountain. The locals prefer to live high off the hog, so to speak, if the names of three of the most popular restaurants are any clue: Three Lil' Pigs, Moore's Whistling Pig Cafe, and the Hog Wild Bar-B-Q. Lodging choices range from camping and cabins in the woods to beautiful chalets that are part-time homes for some well-known celebrities.

Last month's "Homing In" introduced the folks in the Georgia Orienteering Club that organized and hosted the Second USA ARDF Championships near Pine Mountain, April 19–21, 2002. Hams came from 14 states to test their on-foot radio direction finding (RDF) skills. Check that article to see how the competition was staged, how the competitors were divided into age/gender categories, and who got the gold medals. This month, I have more on the courses and the competitors, plus news of next year's championships.

### Medals and mouse pads

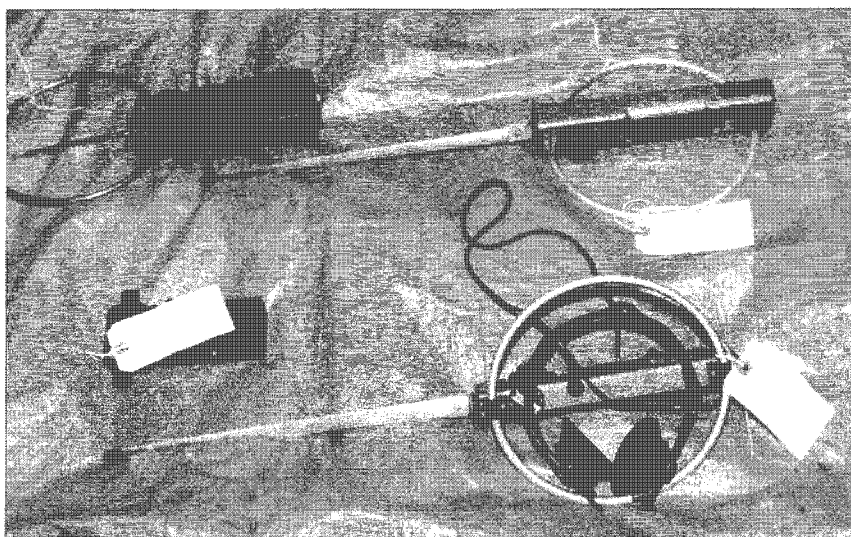
For many years, foreigners have participated in the national ARDF Championships of Europe and Asia. They offer separate awards in two divisions — country-only and overall. At the First USA ARDF championships in Albuquerque last year, there were 17 overseas competitors from Australia, China, and Ukraine.<sup>1,2</sup>

European and Asian foxhunters have shown eagerness to come to ARDF events in the USA, but they prefer to travel during their vacation months of July and August. That would have been too late to hold the USA Championships this year because of the need for early selection of Team USA to the ARDF World Championships in September. So we didn't expect many European visitors in Pine Mountain. Three from

*Continued on page 56*



**Photo A.** Sergei Storkov KD5RNL sprinted through the M21 80m course at just over 15-minutes-per-fox pace to be second overall. In the distant background is April Moell WA6OPS, who spotted bib numbers for the finish line crew as runners emerged from the woods. (KØOV photo)



**Photo B.** KD5RNL brought several Altai 80m ARDF sets, made in Russia. (KØOV photo)





**Photo C.** Here comes Hiroshi "Yoh" Izuta JF1RPZ/KG6CEH to capture second place overall in M40 category on 80 meters. (KØOV photo)

## HAMSATS

continued from page 55

Ukraine sent advance registrations, but they could not obtain USA visas in time to make the trip.

Nevertheless, there were several competitors who could be called "visitors" because they were not citizens and they weren't eligible for membership on ARDF Team USA. Best performing of them was Sergei Storkov KD5RNL, who competed in the most-difficult M21 category, with five required foxes (**Photo A**). He found them all in 167 minutes on two meters to take third overall, then the next day he blazed to the finish in under 76 minutes, just half a minute behind winner Gyuri Nagi KF6YKN.

Sergei, who is originally from Russia, now works for a company in Arkansas and hopes to have his green card soon. Back in his native country, he trained for about eight years under Nikolai Semenov, winner of silver and bronze medals at the World Championships in 2000. Hams like Sergei have been very helpful to ARDF development in the USA. Many competitors got training tips from him and he arranged for a supply of 80-meter ARDF sets (**Photo B**).

Another award-winning visitor was Hiroshi "Yoh" Izuta JF1RPZ/KG6CEH, who was second overall in M40 category on



**Photo D.** Gold, silver, and bronze medals awaited finishers in the USA-only division. Overall winners, most of whom captured medals as USA competitors, received individualized mouse pads. (KØOV photo)

both bands (**Photo C**). He won national ARDF Championships for 1987 and 1993 in his native Japan and now resides in Sunnyvale, California.

Despite the small number of visitors, there were still two complete sets of awards at Pine Mountain. US citizens and aliens with resident status are potential members of Team USA. As such, they competed for gold, silver, and bronze medals in the USA-Only Division. All competitors were eligible for awards in the Overall Division. Instead of medals, the Overall Division winners received cleverly designed mouse pads (**Photo D**). The pads had event category and placing printed on them, so no two were alike.

## Climb complicates courses

Last month, I compared the courses in Pine Mountain with the 2001 championship courses in Albuquerque. That led to questions about the meaning of the official descriptions, such as "6.2 kilometers long with 275 meters of climb" for the 2-meter course. Pine Mountain course-setter Sam Smith N4MAP is a long-time orienteer, so he used international standards for orienteering courses. They state: "Course lengths shall be given as the length of the straight line from the start via the controls to the finish deviating for, and only for, physically impassable obstructions (high fences, lakes, impassable cliffs), prohibited areas, and marked routes. ... The total climb shall be given as the climb in meters along the shortest sensible route."

OK, but exactly what is climb? Does that mean that the courses were all uphill? Not necessarily. In fact, the finish line for the 80m course in Albuquerque last year was 185 meters lower in elevation than the starting line, but the official course climb was 20 meters. That's because climb is computed by plotting the shortest route on a topographical map, counting the number of times that an elevation contour is crossed in the uphill direction, and multiplying by the increment of each contour (usually 5 meters). Downhill contour crossings are ignored.

Everyone knows that it takes much more effort to run uphill than on level terrain. However, the relative ease of running downhill isn't nearly as great as the relative difficulty of running uphill, so climb is the only important measure of altitude change as it affects course severity. According to N4MAP, "A rule of thumb used by the orienteers is to multiply the climb by 10 and add it to the distance. For example, a 6 km course with 250m of climb might feel more like 8.5 km. Of course the actual route chosen by a competitor may have less climb and more distance. That's what orienteering is all about, making the best route choice based on the information that you have."

N4MAP's courses were on par with those of other world-class competitions. For instance, the 80m course at the 2000 World Championships in China was 5.5 km with 420 meters climb. Sam's 80m course at Pine Mountain was 5.7 km with 165 meters climb.

You will find lots more photos of the Pine Mountain ARDF action at the "Homing In"





**Photo E.** Brian DeYoung K4BRI of Kentucky had never attended a championship ARDF event before Pine Mountain. He took home a silver medal in the M40 category from his first 80m hunt. (KØOV photo)

Web site. There is also a link to GAOC's event site, with even more pictures, articles by the organizers, and comments from participants. For instance, one attendee wrote: "Radio-orienteers are getting serious about training; competition was tough. While I was sitting back admiring my medal from last year, the guys from Albuquerque and North Carolina were out running to get in shape for this year's event. They left me behind as they raced for the finish line."

As soon as the 2002 USA Championships ended, it was time for final selection of ARDF Team USA members for the 2002 World Championships in Slovakia, September 2-7.<sup>1</sup> In age/gender categories such as M40, where there were more applications than slots available, first offers went to those who performed best in the 2001 and 2002 USA Championships. Some of them agreed to run in M21 category, making room for others to join the team. As of this writing, there are 12 on the roster, including two YLs. Check the "Homing In" Web site for latest news of Team USA. A full report on the World Championships will be in "Homing In" at the end of this year.

### Cincinnati in 2003

Next year, with no World Championships



**Photo F.** Bob Frey WA6EZV (left) and Dick Arnett WB4SUV have been named co-chairs of the 2003 USA ARDF Championships to be held near Cincinnati. Here they are in split-screen at the 80m finish in Pine Mountain. (KØOV photo)

to prepare for, the USA ARDF Championships will be back to a midsummer weekend. Hosts and organizers will be members of the OH-KY-IN Amateur Radio Society. Events will take place from July 30 to August 2, 2003, near Cincinnati, Ohio. Yes, that's about a year away, but this early announcement will help ARDF enthusiasts from all over the world to make advance plans.

Event venues are being mapped, the official jury is being selected, and the registration period will begin soon. The championships are open to anyone, at any ARDF skill level, from any country with an IARU Amateur Radio society. Even if you've never been to a big formal ARDF event before, you could come home a winner (**Photo E**). Mark your calendar now.

The OH-KY-IN ARS Co-Chairs overseeing the events are Bob Frey WA6EZV of Cincinnati and Dick Arnett WB4SUV of Erlanger, KY (**Photo F**). Both have a wealth of experience in the sport, having competed at the first two USA national Championships, the 1999 IARU Region 2 Championships, and the 2000 World Championships. Other officials on the event committee are Joe Haltermann KI4QI (Awards), Carol

Hugentober WA8YL (Registration/Lodging), Rick Haltermann KI4QJ (Start/Finish), and Brian DeYoung K4BRI (Transportation). Additional support will be provided by the Cincinnati Orienteering Group (OCIN).

To simplify logistics for all competitors, especially the anticipated visitors from Europe and Asia, group housing and local transportation will be available. OH-KY-IN has arranged for a block of double-occupancy rooms at Havighurst Hall, a co-ed dormitory at Miami University in Oxford, Ohio, close to five buffet dining halls on the campus.

The 2003 USA ARDF Championships Web site is already in operation with more details about the events. Registration will soon be available at that site. Get there by link from the "Homing In" site. You can also subscribe to a group E-mail list for latest updates on these events.

### Try foxoring next time

One reason for the recent growth in ARDF is that it appeals to both health-conscious hams and technically-minded athletes. Fans of classic (non-radio) orienteering are discovering the fun of radio-orienteering, but have



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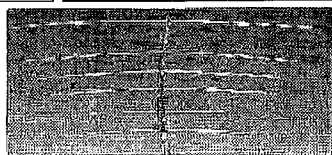
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difficulty getting used to course maps with no controls marked on them, just start and finish. To help your local orienteers ease the transition into radio-O, consider an in-between sport that has gained popularity in Europe, especially the Netherlands. It's called "foxoring," and as the name implies, it's an amalgam of foxtailing and classic-O. Competitors get a map pre-marked with start and finish, plus 12 to 16 small circles. On a normal O-course, the circles would represent controls to be found and punched, but in foxoring they are areas where very weak fox transmitters are on the air.

Because of their low power, these foxes can all be on the same frequency and operate continuously. That will be appreciated by orienteers who haven't gotten used to the one minute on, four minutes off cycle of IARU-rules ARDF events. As a competitor, your mission is to use orienteering techniques to get to the circles in the most efficient order, then use RDF to pinpoint the transmitters, mark your card and get to the finish in minimum time.

Dutch hams use very simple 80m foxes, consisting of little more than a crystal, a CMOS logic gate IC, and an RF transformer to match the output to an antenna that's just six feet long, or less. They call them "spoetnik" foxes because their beeping signals are reminiscent of transmissions from the first Russian Sputnik satellites. Typically, the signals can be picked up 100 to 200 yards away on hand-held receivers.

How about making up some low-power fox transmitters and putting on a foxoring course at the next event of your local orienteering club? Just three or four foxes would be fine to start. You might convince some orienteers to get into ham radio! For more details on foxoring, see the Web site by Alex Boulage. There is a link to it at the "Homing In" site.

Don't forget to include hidden transmitter hunts at your club's hamfests and other outdoor activities this summer. Make sure there is plenty of extra RDF equipment so the kids and grandkids can get in on the fun. Send your stories and photos of local transmitter hunts to me via electronic or postal mail, to the address at the beginning of this article.

## Footnotes

1. Moell, Joe, "Homing In: ARDF Championships Part 1 — Triumph in the Land of Enchantment," *73 Magazine*, December 2001.
2. Moell, Joe, "Homing In: ARDF Championships Part 2 — The World Comes to Duke City," *73 Magazine*, January 2002.
3. Moell, Joe, "Homing In: USA's Fox-hunters Take On The World," *73 Magazine*, April 2002.

## YOU Can Build This VLF to HF Loop Receiving Antenna

*continued from page 15*

don't expect to easily disassemble it for later experimentation!

Next time: linearizing a nonlinear world; parts availability; and references. 73

## Read All About It!

*continued from page 39*

and having seen me stringing wires on the roof, he wondered if I might have had something to do with it. Not being a very good liar, I confessed, and we patched things up at the cost of two beers and a whole can of kitty treats.

I waited for a weekend when Neighbor and his dog were gone, and tried a ten-foot ground rod, and then a few gallons of salt water around the rod. Finally, I buried three 60-foot radials. All to no avail. Our soil was pure beach sand, and with the water table 45 feet down there was no way I was going to get a good ground connection.

Then I remembered the 160-meter mobile antenna I had in 1961. If I could resonate an eight-foot antenna on 160 with a loading coil, I could surely resonate a much longer dipole on 80; it would just take two loading coils. For a bonus, I placed the loading coils each at 12 ft., 10 in., from the center insulator. They would isolate the ends of the antenna at high frequencies, giving me a 17-meter (18 MHz) dipole.

After some experimenting, the final form of the 80/17 meter dipole was as follows:

- RG-59U coax feed to center insulator.
- Run two no. 18 wires, 12 ft. 10 in., to loading coils.
- Coils consist of 59 turns of no. 18 enamel wire close-wound on 7/8-in. diameter form.

• Run two no. 18 wires 26 feet from coils to end supports. These end lengths may be bent if necessary. Mine run 10 feet to the edge of the roof, then 16 feet down the edge to the eaves.

Of course, you can customize the antenna to your needs: shorter end wires, more turns on the loading coil. But very short ends make for poor efficiency.



Does it work? You bet! I've worked California on 80 with five watts. Typically, if I give a 100 W station with a full-size dipole 60 feet up a 589, I'll get back a 579 with my 100 watts; and my antenna is 78 feet long and two feet off the roof. Am I happy? Well, yes. But recently I've developed a yen to work 160 meters ... **73**

## The Hamfest from Hell

*continued from page 40*

sure where his grandmother lived, but that she was in a white house on a street that starts with the letter "B". We searched for two hours, driving around on expensive gasoline that I was paying for, at 6 miles per gallon! Fred called home on his cell phone and asked members of his family if they knew where Grandma lived or what her telephone number was. They didn't seem to know what he was talking about. It was as if Grandma were not real. I was so tired that I wasn't sure if I were real. And we still had almost three hours of driving ahead of us.

It was like a bad, expensive dream. We never did locate his elusive grandmother. Finally he gave up and we drove home. What an experience.

I had been warned that Fred would drive me crazy. If Fred reads this article, I know that he will recognize himself, so all I can say is, "Fred, I am pleased to have you as a friend, but you sure can drive people crazy. So next time we go to a hamfest, let us each drive our own car and I'll meet you there. And one more thing: After my experience of us being together for only one day, I would like to suggest that you thank your poor wife for putting up with you. Buy her some pretty flowers." **73**

## The Write Stuff

*continued from page 41*

it. Just tell me how the project really went.

Don't forget to tell me about your mistakes, too! Honestly, I've been known to "let the smoke" out of a few

transistors, put a polarized "cap" in reversed, and all the other "duhhh" factors of building. Your comment just may keep me from making a mistake, but I doubt it!

Wouldn't it be great to see your name in print in an international magazine? Believe me, it really is a boost to your ego to have an article make it to publication. The editors at 73 will be glad to send you their "how to" piece on submitting an article for consideration. If (big word with lots of meaning) they select your work for publication and make you a monetary offer for it. **DON'T QUIT YOUR DAY JOB!**

This is a "hobby venture," and the dollar amount received is pleasant enough, but not enough to put your kids through college.

So, while you're sitting there gloating over that latest venture, turn your computer on and try writing a piece telling me how much you accomplished. I will never know about your accomplishment unless you tell me, and you won't know if you can write an article if you haven't tried.

Who knows, you may have one more talent hidden away that even you aren't aware of! And 73 pays cash! **73**

## CALENDAR EVENTS

*continued from page 43*

station, 3 points for a CW QSO, 1 point all other QSOs. Remember, only the highest single point value may be applied per QSO. Multipliers: For stations outside MDC: 1 per MD county + DC + Baltimore City (25 possible). For MDC Stations Only: The basic 25 above + each of the other 49 US states + each DX country. Note: An optional scoring/summary sheet that makes scoring easy is available for an SASE. This is available from Antietam Radio Association and at the Web site. Certificates are awarded to all stations with 50 or more QSO points in their entry. Please visit the Maryland-DC QSO Party Web site at [www.w3cwc.org]. Send logs and scoring summary with an SASE by September 20th to the contest primary sponsor, Antietam Radio Association, P.O. Box 52, Hagerstown MD 21741-0052. Logs can also be E-mailed in plain text format to [wa3eop@arrl.net]. A Special Award — The Worked All Maryland Multipliers Award — has yet to be claimed. Last year W3LRC almost did it with 24 of 25 worked. WA3HAE accomplished that the year before! Who will be the first person to do this? The

only stipulations are: 1) all contacts must be from a single QTH, 2) all contacts must be made during a single year's QSO party. Donations towards the continued operation of this activity are always welcome and may be sent along with hard copy entries to the primary sponsor. See you in the pileups. Page WA3EOP.

**AUG 17, 18, 19**

**NEW JERSEY QSO PARTY** The Englewood Amateur Radio Association, Inc. invites all amateurs the world over to take part in the 43rd Annual New Jersey QSO Party. Rules: (1) The time of the contest is from 2000 UTC Saturday, August 17th to 0700 UTC Sunday August 18th, and from 1300 UTC Sunday August 18th to 0200 UTC Monday August 19th. (2) Phone and CW are considered the same contest. A station may be contacted once on each band — phone and CW are considered separate bands — CW contacts may not be made in phone band segments. New Jersey stations may work other New Jersey stations. (3) General call is "CQ New Jersey" or "CQ NJ". New Jersey stations are requested to identify themselves by signing "De NJ" on CW and "New Jersey calling" on phone. Suggested frequencies are 1810, 3535, 3950, 7035, 7235, 14035, 14285, 21100, 21355, 28100, 28400, 50-50.5, and 144-146. Suggest phone activity on the even hours; 15/10 meters on the odd hours (1500 to 2100 UTC); 160 meters at 0500 UTC. (4) Exchange consists of QSO number and QTH state/province or country. New Jersey stations will send county for their QTH. (5) Scoring: Out-of-state stations multiply number of complete contacts with NJ stations times 3 points per QSO times the number of New Jersey counties worked (maximum of 21). New Jersey stations multiply the number of complete contacts times 3 points per QSO times the multiplier. The multiplier is the sum of the number of states (other than NJ), Canadian provinces, and NJ counties worked. Maximum is  $49 + 13 + 21 = 83$ . (6) Certificates will be awarded to the first place station in each New Jersey county, state, province, and country. In addition, a second place certificate will be awarded when four or more logs are received. A total of two plaques have been donated by the ARRL Section Managers for NNJ and SNJ to the highest scoring single operator station residing in each of their sections. (7) Logs must also show the UTC date and time, QSO exchange, band, and emission, and be received not later than September 14, 2002. The first contact for each claimed multiplier must be indicated and numbered and a check list of contacts and multipliers should be included. Multi-operator stations should be noted and calls of participating operators listed. Logs and comments should be sent to: Englewood Amateur Radio Association, Inc., P.O. Box 528, Englewood NJ 07631-0528. A #10 size SASE

*Continued on page 61*



## Coronal Holes

*The "summer doldrums" aren't quite over, but a seasonal improvement in conditions should become apparent toward the end of August. The range between the Maximum Usable Frequency (MUF) and Lowest Usable Frequency (LUF) will begin to expand as autumn approaches, providing longer and more frequent openings on more bands.*

Solar activity is also likely to decrease during the latter half of the month, improving the propagation outlook even further. However, there are five trouble spots to watch out for, as indicated by the "Fair-to-Poor" (F-P) and "Poor" (P) days marked on the calendar. The 19th-21st looks particularly troublesome with moderate to strong flares or other events likely.

You may have noticed a lack of clearly "Good" (G) days in my forecasts over the last year. One reason for this has been the high incidence of another solar phenomenon — coronal holes. Coronal holes are large regions — much larger than sunspots — that are cooler and less dense than the surrounding atmosphere, or corona. They are usually located over the polar regions of the sun, but during solar maximum they may appear anywhere on the solar disc. When this happens we often see a marked increase in the solar flux and more frequent geomagnetic disturbances.

Unlike the rest of the sun, where looping magnetic fields reconnect to the surface and help contain the solar "plasma," the magnetic field lines associated with coronal holes are open ended and extend far out into the solar system. As a consequence, huge amounts of ionized particles (plasma) escape into interplanetary space, traveling along these field lines up to three times faster than the ordinary solar wind. These energetic particles stream out at speeds up to 900 km/s and, if directed toward us, slam into our magnetosphere causing distortions in earth's magnetic field. If the distortions are large enough, we have a geomagnetic storm and much degraded HF communications. When the distortions are small we experience spotty conditions, particularly across or near the auroral ovals.

Coronal holes often last for months, and some have been observed to last for years. Unfortunately for us, they reappear

August 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
				1 F	2 F-G	3 F
4 F	5 F-G	6 F	7 F-P	8 F-G	9 F-G	10 F
11 F-P	12 F	13 F	14 F-P	15 F	16 G	17 VG
18 F-G	19 F-P	20 F-P	21 F-P	22 F-G	23 G	24 G
25 VG	26 F-G	27 F-G	28 F	29 F	30 P	31 F-P

EASTERN UNITED STATES TO:																
Country	10-15	15-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150	150-160
Central America	15-20	(15) 30	20 (40)	(20-40)	x	(20)	20	(20)	(15)	(15)	15 (20)	(10) 17				
South America	15 (20)	(15) 20	20 (40)	(20-40)	(20)	x	(15)	(15)	x	(10)	(10-20)	(10) 20				
Western Europe	20	20	(20-40)	(40)	x	(20)	x	x	x	x	(20)	20				
South Africa	x	(40)	x	(20)	x	x	x	x	(15)	(15)	x	x				
Eastern Europe	20	20 (40)	(20)	x	x	x	(20)	x	x	(15)	(15)	(20)				
Middle East	20	20 (40)	(20)	x	x	x	x	x	x	x	(20)	(15)				
India/Pakistan	(15-20)	(20)	x	x	(20)	x	x	x	x	x	x	x				
Far East/Japan	(15)	x	x	x	x	x	(20)	(15-20)	(15)	x	x	(15)				
Southeast Asia	(15-20)	x	x	(20)	x	x	(20)	x	x	(15)	x	x				
Australia	(15)	(15)	x	x	(20-30)	(20-30)	(20)	(20)	x	x	x	x				
Alaska	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	x	(15)	(15-20)				
Hawaii	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	x	(15)				
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(15) 20	(10) 20	(10-20)	(10-20)	(10-20)	(10) 20				
CENTRAL UNITED STATES TO:																
Country	10-15	15-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150	150-160
Central America	(10) 20	(15) 30	20 (40)	20 (40)	(20)	(20)	(15) 20	(15-20)	(10-20)	(10-20)	(10) 17					
South America	10 (20)	(10) 20	(15) 30	(15) 30	(20-40)	(20)	(20)	(15)	(15)	(10)	(10-15)	(10-20)				
Western Europe	(15) 20	20	(20-40)	(20-40)	x	(20)	(20)	x	x	x	x	(15-20)				
South Africa	x	x	(40)	(20-40)	(20)	x	x	x	(10-15)	(10-20)	(20)	x				
Eastern Europe	(20)	(20)	(20)	(20)	x	x	(20)	(20)	x	(15)	(15-20)	(15-20)				
Middle East	(15-20)	(20)	(20)	(20)	x	x	x	x	x	x	(20)	(20)				
India/Pakistan	(15-20)	(15-20)	(20)	x	x	x	(20)	x	x	x	x	x				
Far East/Japan	x	(15)	(15)	x	x	(20-40)	(20)	20	(20)	x	x	x				
Southeast Asia	(15)	(15)	(15-20)	(20)	x	x	(20)	(20)	(15-20)	(15)	(15)	x				
Australia	(15)	(15)	(15)	(20)	20 (40)	(20-40)	(20)	20	(20)	x	(15)	x				
Alaska	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(15-20)	(10) 30	(10-20)	(10-20)	(10) 20				
Hawaii	(15-20)	15 (20)	20	20	(20)	(20)	(20)	x	x	x	(15)	x				
WESTERN UNITED STATES TO:																
Country	10-15	15-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150	150-160
Central America	(10) 17	(15) 20	(15) 20	20	(20)	(20)	(20)	(20)	(15)	(15)	x	(15)	(10-15)			
South America	(10-20)	(10) 17	15-20	(15) 20	(20)	(20)	(20)	(15)	(15)	x	(15)	(10-15)				
Western Europe	(15-20)	(20)	20	(20)	x	x	x	(20)	(15)	(15)	(20)	(15-20)				
South Africa	x	x	x	(20)	(20)	x	x	(20)	(20)	(15)	x	x				
Eastern Europe	(15-20)	(20)	(20)	(20)	x	x	x	(20)	x	x	x	(15-20)				
Middle East	(20)	(15-20)	(15-20)	(20)	x	x	x	x	x	x	x	(20)				
India/Pakistan	x	x	(15)	x	x	x	x	(20)	x	(15)	x	x				
Far East/Japan	(15)	(15)	(20)	(20)	(20)	(20-40)	(20-40)	(20)	(20)	(15-20)	x	(15)				
Southeast Asia	x	x	(15)	(15)	x	(20)	(20)	(20)	(15-20)	(15)	(15)	x				
Australia	(10-15)	(10-15)	15	(15-20)	20	20	20	(20)	20	(20)	x	(15)				
Alaska	(10) 40	(10) 40	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	20-40	(15) 40	(10) 40	(10) 40	(10) 40				
Hawaii	(10-15)	(10-20)	(10-20)	(15-20)	20	20	(20-40)	20 (40)	(20-40)	x	x	(10-15)				
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(15-20)	(10) 20	(10-20)	(10-20)	(10) 20				

**Table 1. Band, time, country chart.** Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



every 27 days with the sun's rotation, causing recurring problems for DXers. On the other hand, their effects are somewhat more predictable than other solar phenomena. Coronal holes have also been observed to occur more frequently after the peak of a sunspot cycle (where we are now) and also seem to indicate the intensity of the next cycle. If we see lots of coronal holes over the next several years it is a good bet that Cycle 24 will be a doozy!

For those interested in looking at x-ray spectrum photographs and learning more about coronal holes, go to the Yukoh X-Ray Observatory Web site at [http://solar.physics.montana.edu/YPOP]. Until next time, 73!

## Band-by-band summary

### 10 and 12 meters

Signals will be weak due to daytime absorption, but some openings can still be found, especially from the southeast through southwest. Peaks will occur in the morning or late afternoon, with evenings remaining weak but open until 9 or 10 p.m. Skip should fall between 1,000 and 2,000 miles.

### 15 and 17 meters

DX should be slightly improved over last month with stronger signals heard early in the morning or late in the afternoon. These bands should hold up well into the evening, especially later in the month. Skip should extend out to 2,300 miles.

### 20 meters

Expect strong signals in the morning, late afternoon, and evening hours. Some days the band should hold up past midnight, especially west or northwest of your location. Short-skip can vary between 500 and 200 miles during the day and from 1,000 to 2,300 miles at night.

### 30 and 40 meters

Atmospheric noise will continue to plague these bands, but some improvement should be seen late in the month. Try the gray-line technique for your best chance at very long distances. Skip can vary between 500 to 2,000 miles at night and about 750 miles during the day.

### 80 and 160 meters

High static will mask signals on these bands most of the time, but late August may provide some relief for this situation. Peaks

will occur around midnight and in the hour or so before sunrise. Short-skip will be between 1,000 and 2,000 miles. 73

## CALENDAR EVENTS

*continued from page 43*

should be included for results. (8) Stations planning active participation in New Jersey are requested to advise EARA by August 1st of your intentions so that we may plan for full coverage from all counties. Portable and mobile operation is encouraged. 73

## ABOVE & BEYOND

*continued from page 46*

amateur-related projects. My thanks go to Kerry N6IZW, who worked out the conversion on this amplifier and so many other things too numerous to mention.

If you have any questions, drop me an E-mail to [WB6IGP@ham-radio.com]. For general information on this and other related 1296 MHz conversion project items, and amateur microwave radio in general, look on the San Bernardino Microwave Society Web page at [http://www.ham-radio.com/sbms/sd/]. Look under technical papers from the San Diego Microwave Group. This Web page has a lot of information, not just on 1296 MHz, but on all frequencies of operation up to 24 GHz and beyond. A great Web site to visit!

For those who are interested in obtaining a 5 watt amplifier module and PC board for conversion to 1296 MHz, I will make them available with a set of four chip capacitors for \$25 postpaid, US destinations (Calif. residents only, add sales tax). 73

## THE DIGITAL PORT

*continued from page 54*

RTTY macro buttons appear in that mode. You really do not have to revert to knobs on the rig just to escape. There is a default BPSK macro included with Zakanaka that will bring you back to where the new PSK macros are visible.

It will become obvious that you will need to at least write copies of the filter macros in the set of RTTY macro buttons. Otherwise, it is clumsy to switch back and forth.

## An easy chore

It may have taken you a bit of time to get the first set of macros set up and working,

but I found it is very quick and easy to copy the contents of a macro from one macro to another using the copy (Ctrl+C) and paste (Ctrl+V) commands in Windows. Have to highlight the text first, but once you get the hang of it, moving those hard-to-write sequences is a snap.

So pick your favorite spot in the RTTY macros and go for it. By the way, that is how I brought the contents of the macros into the article, and it is the method I use, whenever possible, to insert Web site addresses into my browser. Makes the work much less intimidating.

For those who are not familiar, Zakanaka and Logger are freeware programs. They are free for the download. A lot of work has gone into their development.

The upcoming surprise is there is a new version of Logger on the way. I have no idea of a release date. It could be many months down the road. I am sure it will be much improved over what I consider a very fine product now. So we will just have to wait and see what is hiding in the wings.

## A mighty piece of software has reawakened

I mentioned a while back that it appeared the XPWin program from XPWare was no longer available. I got word in the last month there is a new Web site at [www.glaswerks.com/xpware/].

I went there and sure enough, the software is alive and kicking and I was able to download and install an update that looks like a user friendly package. This is shareware to control the PK232 in my case, and there are versions available for other popular TNCs. Glad to see it is back.

## Limiting Web ads

If you are like me, you get annoyed with some of the pop-up ads on the Internet. There are several in my case. One was some sort of surveillance camera, another was a phone company to beat all rates and then there was a life insurance ad, just to name a few. You notice I said "was."

Got rid of them. There is piece of software at [http://www.analogx.com/contents/download/network/pow.htm] that simply puts all that baloney behind you. It is called "POW" and all I did was download the program, install it, and that was the end of those pesky little ads, hopefully, forever.

## Shack repairs and updates

A few weeks ago, I had a project force itself on me. My antenna had stood its last wind. I was getting so much noise in the



receiver it was nearly impossible to copy anyone. I pulled it down and had three broken traps. Did some repairs and do not have it back up at this writing. The wind has to be calm for that operation.

However, I had the tilt over in such a place the antenna was sitting on the ground directed straight up. This made an antenna effectively consisting of a trap dipole eight feet off the ground broadside toward Europe. I plugged it in and, not only is the noise to a minimum, but the first few stations heard were from Europe!

What is good is I was without any way to display a signal trace so I could observe the filtering described in this article until the repair. Plus it made the screenshot possible.

Speaking of making things possible, this new computer has only one 9-pin serial port. Several USB ports, but they seem to think nothing hooks up to those old-timey ports. Well, I decided I needed at least two more, so I found a board and got it here.

Another minor learning experience. I spent a little time reading the documentation for the board. It looks to be an excellent bit of circuitry, but the supplied literature is in two sections. The first is a little booklet that leaves something to be desired in the translation. The second is several pages including a title, "How to understand the documentation." Just about enough material to get the full meaning of "Rolling on the Floor Laughing." I think I understand, made some notes and underlined several important seeming phrases. Will know all about these things by next month.

## Where's The Chart?

For the last five years 73 has been kind enough to publish my listing of software and Internet Web sites where software and other information could be found and downloaded. This becomes a momentous task to keep such a thing in order. Last winter, Bob WA2HNG very kindly placed The Chart on his informative ham radio site at [[http://www.qsl.net/wa2hng/ham\\_radio.htm](http://www.qsl.net/wa2hng/ham_radio.htm)].

That has been a real help to a lot of hams because it is so easy to go to Bob's Web site and click on an URL and not have to type in the address. I received a number of favorable comments along those lines and said to myself, "That is a good idea. I should have done that long ago." But it stopped there until recently.

73 was beginning to bog down with all the changes I kept sending them, so we agreed it was time to get official and establish a site and put as much useful ham info on it as I could and include

the information from the used-to-be-published Chart.

So this is the address: [<http://kb7no.home.att.net/>]. Short and to the point. Easy to type in the first time, then store it for later in the browser. It works. I just went there and clicked a link and downloaded a piece of software I had forgotten to install in this computer.

That is the news from here for this month. I appreciate the E-mails you folks send. I try to answer whatever questions you may have. So give me a shout at [[KB7NO@worldnet.att.net](mailto:KB7NO@worldnet.att.net)]. 73 for now, Jack KB7NO. 73

## NEVER SAY DIE

*continued from page 8*

So let's get teams into the Middle Eastern and Asian countries that need economic development and light the flame.

Products? Take a look at what I'm wearing these days. My shoes come from China, my socks from Bangladesh, my pants from United Arab Emirates, my jacket from Guatemala, and my shirt from Mongolia. No, I'm not exaggerating — Mongolia! Just take a good look at your clothing labels.

Using modern technology (Jim Patterson's patented root feeders), we can help the Arab countries make their deserts bloom, producing some of the best-tasting and healthiest food in the world, while using a minimum of water. How'd you like to be able to buy a five-pound tomato that tastes like you grew it in your own hot house and picked it fully ripe?

Like America, more and more developed countries are moving their low-pay jobs to developing countries. Here in America, the prospects for unskilled, uneducated workers is bleak. Not even the strongest unions can protect low-skilled jobs from moving out of the country. Shipping and communications are just too cheap in these days of container ships and satellites. Sure, we still have old farts like Senator Hollings trying to get Congress to set up trade barriers to protect southern clothing makers, thus helping keep his constituents making low wages instead of getting into higher-wage businesses.

## Education

By setting up radio and TV stations, we can help trigger a whole new era in education in Muslim and other developing countries. Remember, there are very few well educated poor people and very few

poorly educated wealthy people. Education is the key, and that key can unlock the minds of billions of people, freeing them from poverty, ignorance, and oppression. Low cost, high quality education delivered by radio, TV, and DVDs. No, I'm certainly not talking about teaching the pitiful crap our public school system and colleges are foisting on our kids. We need to close down that whole government-controlled nightmare.

One of the basic reasons we're so hated by Third World people is our obvious ability to outperform them. So, let's give them a way to start catching up. We have everything to gain, and little to lose. Sure, it's going to take a year or two to get this all going, but it'll eventually defuse the hate and blow away our worry about terrorism or being nuked or anthraxed by Saddam.

You know, if we start teaching the world's kids to speak English when they are two years old, they'll take to it and we won't have to translate our educational stuff into 200 languages.

## Conspiracies

Conspiracy buffs (a/k/a crackpots, nuts, fans) are having a ball with the WTC mess. I'm building up quite a file and would appreciate more candidates. Well, there's obviously some fishy things going on which are feeding the frenzy. Like the strong suspicion that the fourth plane, which crashed in Pennsylvania, was shot down by the Air Force instead of being crashed by the passengers fighting with the terrorists.

Like the reason the Russians attacked Afghanistan was so that they could lay a 1,000-mile pipeline from the Caspian Sea, where there are said to be some \$6 trillion in oil and gas reserves (larger than under Saudi Arabia), to the Arabian Sea. Like the U.S., wanting to own that pipeline, supporting Bin Laden and the Taliban in their fight against the Russians with billions of dollars of arms. Like as late as 1998 the U.S. paying the salary of every Taliban official in Afghanistan. Like Unocal, the giant American oil conglomerate spending over a billion dollars on geological surveys (with Taliban support) for the pipeline. Like all of the leading Taliban officials visiting Texas in 1998 to negotiate with Unocal.

Like in 1999 when the Taliban threw Unocal out of Afghanistan and awarded the pipeline project to a company in Argentina. Like John Maresca, Unocal VP, testifying to Congress that there would be no pipeline until the Taliban was gone so a more friendly government could be established. Like the Taliban suddenly

*Continued on page 64*



# Wise Up!

Here are some of my hooks which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait! You see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Blood Purifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a hunch of other serious illnesses. It's working miracles! \$10 (#01)

**Plant Growth Stimulator:** This has the same circuit as the above, all ready to use. Postpaid: \$155 (#PGS).

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life

aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the *Drum*. \$5 (#10)

**Travel Diaries:** You can travel amazingly inexpensively — once you know the ropes. Enjoy Shen and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under \$1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. \$5 (#11)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. Yes, of course we pay for your articles! \$0 (#78)

**Wayne's Caribbean Adventures:** My super budget travel stories — where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

No, I'm not a nut case.  
**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngsters' IQs, helps plants grow faster, and will make you healthier. Just wait! You hear some of Gottschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UL, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)  
**Reprints of My Editorials from 73:** Very few things in this world are as we've been taught, and as they appear. As an iconoclast I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 100 Editorial Essays:** \$5 (#72)  
**1997 157 Editorial Essays:** \$8 (#74)  
**1998 192 Editorial Essays:** \$10 (#75)  
**1999 165 Editorial Essays:** \$8 (#76)  
**2000 101 Editorial Essays:** \$5 (#77)  
**2001 104 Editorial Essays:** \$5 (#78)  
**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Colloid Reprint:** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Clips:** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)  
**Silver Colloid Kit:** \$25 (#80-98-99)

**Four Small Booklets Combined:** Dowsing: why and how it works; Super Organic Food: a trillion dollar new industry; Schools in 2020: another \$ trillion industry; Anthrax: a simple cure. \$3 (#86)

**Stuff I didn't write, but you need:**  
**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs — such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$25 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon and wondered at their weird gate. Wait! You see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of give aways that the photos and films had to have been faked. With our gov't it seems to be just one cover-up after another. \$40 (#93)

## Radio Bookshop

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Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

**Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls.** The deadline for the October 2002 classified ad section is August 10, 2002.

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**SMART BATTERY CHARGERS** and more, [[www.a-engineering.com](http://www.a-engineering.com)] BNB653

**Wanted: Information and References** on PRC-6 Walkie-Talkie. Louis L. D'Antuono, 8802 Ridge Blvd., Brooklyn, NY 11209. Tel: 718-748-9612. After 6:00PM. BNB654

## NEVER SAY DIE

*continued from page 8*

became evil in the American media. Like Pakistani Foreign Secretary Naiz Naik being told by senior American officials in July 2001 that military action against Afghanistan would start in October. Like even though none of the 9/11 hijackers were from there. Bush declaring war against Afghanistan. Like there's now a new government in Afghanistan whose leader formerly worked for Unocal. Like the U.S. special envoy to deal with the new government was the "chief consultant to Unocal." Like the Bush family is up to here in the oil business. Like President Bush made his fortune in the oil business. Like Bush Sr. works with the Carlyle Group, which specializes in oil investments. Like the U.S. government quietly announcing in January 2002 that it would support construction of the Trans-Afghanistan pipeline. Like President Musharraf of Pakistan and Afghanistan-Unocal's announcement of an agreement in February 2002 to build a pipeline from Central Asia to Pakistan via Afghanistan.



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**COVER:** In Dominica, FAIRS raises an HF station. KK4WW/J79WW is on ladder, which KE4UGF/J79UGF holds as JA7KAC/J79KAC looks on.

## QRX . . .

### Giggle Hertz: WARNING! Children!

For those who already have children past this age, this is hilarious. For those of you who have grandkids, this is considered parents' revenge. For those who have children this age, this is not funny. For those who have children nearing this age, this is a warning. For those who have not yet had children, this is birth control.

The following came from an anonymous mother in Austin, Texas.

Things I've Learned From My Children (Honest and No Kidding):

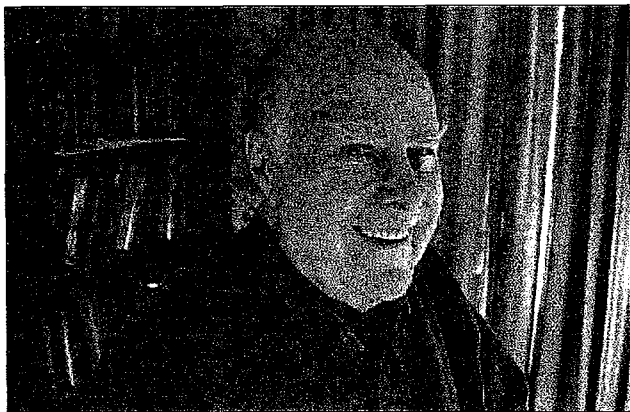
1. A king-size waterbed holds enough water to fill a 2,000 sq. foot house 4 inches deep.
2. If you spray hair spray on dust bunnies and run over them with roller blades, they can ignite.
3. A 3-year-old's voice is louder than 200 adults in a crowded restaurant.
4. If you hook a dog leash over a ceiling fan, the motor is not strong enough to rotate a 42-pound boy wearing Batman underwear and a Superman cape. It is strong enough, however, if tied to a paint can, to spread paint on all four walls of a 20 by 20 foot room.
5. You should not throw baseballs up when the ceiling fan is on. When using the ceiling fan as a bat, you

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article (IBM (ok) or Mac (preferred) formats), carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

### NEVER SAY DIE

Wayne Green W2NSD/1

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#### Birthday Present

Please don't tell me that you've forgotten the 80th birthday present I asked for. It's a present you can give me, plus give someone else twelve monthly reminders of your generosity. It's a gift subscription to *73* for a friend of yours. The regular subscription is \$25, but until the end of September you can give a gift subscription for \$20. This will make both me and your friend happy. A two for the price of one deal. Send cash, check, money order, MC, or Visa info to *73* Magazine, 70 Hancock Road, Peterborough NH 03458. Oh, and include the name, call, and address of the giftee.

#### Perspective

My early memories are of my dad's Model T, which had to be cranked to start. I think of that as I get into my Honda van, heading for Durham to address a Rotary Club about my new magazine. I touch type my destination on the screen and in seconds my van knows where it is and the best route to get me to Durham, complete with a map display. The system talks me through every turn.

The one-lane twisting dirt road through Franconia Notch of my childhood has been replaced by Interstate 93, where I'm able to drive at 90 and 100 mph (to keep up with the traffic), protected by my radar detector. If I want to talk with anyone anywhere in the world I've a cell phone at hand. No more ring three on

party line 32 with a hand crank phone on the kitchen wall and Mrs. Wallace down the road listening in.

Nostalgia, not being what it used to be, my point is that the changes I've seen in the world during my lifetime are more than a hint of how different the world is going to be for the people in 2080. It will be a life we can't even imagine today.

Eighty years ago New Hampshire was well known for making shoes and clothing. You can still see the huge old mill buildings along the Merrimack River in Manchester. My shoes today were made in China, my socks in Bangladesh, my pants in United Arab Emirates, and my shirt in Mongolia. They're making Segways in one of the old mill buildings. Eighty years from now?

When I was seven my grandparents toured Europe. That was a big deal then. My mother was good friends with Osa Johnson, who married Martin Johnson when she was 17. They did some wonderful films of Africa in the 1930s. It never occurred to me that someday I'd be touring the upper reaches of Uganda, Kenya, and Tanzania. I don't think it'll be long before our kids will be routinely touring all of Africa, China, the Andes, and even Borneo in school groups. They will be in daily touch with their family members, swapping videos.

A wrist watch was a big deal when I was a kid. Now my watch automatically sets itself every night via a radio

signal from Boulder, Colorado. It also has a memory bank built-in, a calculator, and no stem to pull out and wind.

When I was a kid around 90% of Americans lived on farms. Now it's more like 4%. The farm workers moved to factories and cities. Now factory work is moving to Bangladesh and Mongolia, helping third world countries build their economies, and we're doing the marketing (which is where most of the money is).

Those who bet on the future are going to get the best return on their investments, in both money and business careers. Those who remain stuck in the past (or even the present) will fall behind. Every business needs a visionary to help it chart a path to the future. Hmm, yes, I'm for rent.

#### Sharing

In my talks to the Chambers of Commerce, Rotary, Kiwanis, and other groups around the state while promoting *NH ToDo*, my theme has been sharing.

For some reason, probably either a genetic defect or an influence from a previous life, whenever I've found something I've really enjoyed, I've always had this tremendous urge to share my pleasure with as many other people as I could. Heck, this was what got me started in publishing *50* years ago.

I'd been having more fun with ham teletype than would be allowed by the government if Congress or the FCC

had had any hint of it. The major-major guru in the field was John Williams W2BFD, but I couldn't get him off dead center in starting a RTTY newsletter.

So, when I started to work in 1951 at WXEL-TV in Cleveland as a program producer-director and I saw a mimeo machine sitting there, I started a monthly newsletter, *Amateur Radio Frontiers*. It soon outgrew the mimeo machine, so I went to having it offset printed, with me drafting all of the schematics and taking the photographs. This led to an RTTY column in *CQ* magazine, which led to me becoming the *CQ* editor.

With *CQ* I was able to share the almost 20 years of fun I'd had at the workbench building electronic stuff by publishing lots of construction articles. I loved VHF so I got my pal Sam Harris W8UKS to do a VHF column. Indeed, my first contact when I got my ticket was on 2-1/2 meters with a walkie-talkie I'd built.

My theme with the members of the New Hampshire groups was for them to get busy with their word processors and write articles and letters to the editor sharing the fun and excitement they've had in our state.

Now, how about you? What is the most fun you've ever had in the ham radio? How can I get you to take off a few minutes and share your experience with the *73* readers? I've been writing for over 50 years about the fun I've had, so now it's your turn.

*Continued on page 35*



*continued from page 1*

have to throw the ball up a few times before you get a hit. A ceiling fan can hit a baseball a long way.

6. The glass in windows (even double pane) doesn't stop a baseball hit by a ceiling fan.

7. When you hear the toilet flush and the words "Uh-oh," it's already too late.

8. Brake fluid mixed with Clorox makes smoke, and lots of it.

9. A six-year-old can start a fire with a flint rock even though a 36-year-old man says they can only do it in the movies. A magnifying glass can start a fire even on an overcast day.

10. Certain LEGOs will pass through the digestive tract of a four-year-old.

11. Play Dough and microwave should never be used in the same sentence.

12. Super glue is forever.

13. No matter how much Jell-O you put in a swimming pool, you still can't walk on water.

14. Pool filters do not like Jell-O.

15. VCRs do not eject PB&J sandwiches even though TV commercials show they do.

16. Garbage bags do not make good parachutes.

17. Marbles in gas tanks make lots of noise when driving.

18. You probably do not want to know what that odor is.

19. Always look in the oven before you turn it on. Plastic toys do not like ovens.

20. The fire department in Austin, TX, has a 5-minute response time.

21. The spin cycle on the washing machine does not make earthworms dizzy.

22. The spin cycle on the washing machine will, however, make cats dizzy.

23. Cats throw up twice their body weight when dizzy.

*Thanks to the June 2002 Radio Flyer, the UBET ARC newsletter.*

## Tabletop Emergency Exercise

On Tuesday, June 6, 2002, the Xerox El Segundo (California) Disaster Response Recovery Team participated in an emergency drill with about 25 participants. XAR (Xerox Amateur Radio) was represented by the following persons: Terry Wells KC6VCL, Don Bornemann KC6OKU, Doug Gilbert WA6LXB, Art Zeller KD6JEG, Lew Siegler N6AES, and Hugh Wells W6WTU.

This particular drill was based upon a huge earthquake that disrupted Xerox site power, causing several buildings to sustain damage, and water main disruption and flooding in both Xerox buildings and in public streets. Also, fires broke out in numerous places, employees were injured, car wrecks occurred in the surrounding streets, and the worst was a toxic gas release from the

local oil refinery. The toxic fumes were drifting toward two of the local Xerox facilities. Individuals injured in car wrecks sought assistance by entering the lobbies of various Xerox buildings. The news media entered Xerox lobbies seeking stories on damage and action taken to recover from the disaster.

Terry and Don sat in the Command Center along with the bulk of the Disaster Response team. Terry's function, supported by Don, was to be the receiver of incoming messages handled by hams. For this exercise, several hams were located outside of the Command Center (as field reporters) and fed canned messages into the Center via the XAR repeater. Terry also provided feedback responses to the field that resulted from action taken on the received messages.

One of the intentions of the exercise was to create a stressful situation within the Command Center in order to demonstrate the need for organization within the affected operations. Our task, as hams, was to feed the "status" messages into the Center at a reasonably fast rate such that the Response team would be hard pressed to handle efficiently the needed action.

Even though our Xerox facility has a very complete communications network with multiple frequencies, we, as hams, provide the backbone for site communications during an emergency. This was my first participation in a "tabletop drill" so I wasn't well prepared, but I did learn from the experience even though I was on-board at Xerox for the Y2K exercise. But that exercise was nothing like the one that we experienced on that Tuesday — this exercise seemed to be real.

This earthquake exercise was designed to involve all of the various maintenance groups within the facility in addition to medical assistance teams, fire response, public press release persons, etc. Action required routing medical assistance to the areas where needed, removing people trapped in elevators and offices, and planning and executing safe evacuation routes out of the multistory buildings and away from the toxic fumes.

Following the drill, which lasted about 2 hours, we gathered in the Command Center, did a critique of the event, and put some plans into place for the next drill — which will be performed at a slower pace using a "stop action" technique. Now that everyone has had the opportunity of experiencing the chaos and pressure that occurs during an emergency, the next drill will involve honing the procedures and techniques for streamlining the actions occurring within the Command Center. The consensus was that the pressure exerted by the exercise made the experience more real because individual attention was focused more on "action" rather than on "this is a drill."

A written critique of the exercise was also done so that a more in-depth analysis can be performed in preparation for the next event. One of the shortcomings experienced by participating ham operators was the difficulty in writing down,

accurately, messages transferred via radio. XAR will need to examine "lessons learned" and develop plans on how to perform more efficiently with communications while interfacing with the Command Center and field teams.

*Thanks to Hugh Wells W6WTU.*

## Pleasing Everyone

There once was an old man, a boy, and a donkey.

They were going to town, and it was decided that the boy should ride. As they went along, they passed some people who thought that it was a shame for the boy to ride and the old man to walk. The man and boy decided that maybe the critics were right, so they changed positions.

Soon they passed some more people who thought that it was a real shame for that man to make such a small boy walk. The two decided that maybe they both should walk.

Soon they passed some more people who thought it was stupid to walk when they had a donkey to ride. The man and the boy decided that maybe the critics were right, so they decided that they both should ride.

They soon passed other people who thought that it was a shame to put such a load on a poor little animal. The old man and the boy decided that maybe the critics were right, so they decided to carry the donkey.

As they crossed a bridge, they lost their grip on the animal and he fell into the river and drowned.

The moral of this story is this:

If you try to please everyone, you will eventually lose your ass.

*Thanks to Greg WB9SNZ, via the November 1999 Squelch Tale, newsletter of the Chicago FM Club.*

## Now That I'm Older ...

Here's what I've discovered:

- I started out with nothing, and I still have most of it.

- My wild oats have turned to prunes and All Bran.

- I finally got my head together, and now my body is falling apart.

- Funny, I don't remember being absent-minded.

- All reports are in. Life is now officially unfair.

- If all is not lost, where is it?

- It is easier to get older than it is to get wiser.

- Some days you're the dog, some days you're the hydrant.

- I wish the buck stopped here. I sure could use a few ...

- Kids in the back seat cause accidents; accidents in the back seat cause kids.

- It's hard to make a comeback when you haven't been anywhere.





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• The ONLY time the world beats a path to your door is if you're in the bathroom.  
• If God wanted me to touch my toes, he would have put them in my knees.

• When I'm finally holding all the cards, why does everyone decide to play chess?

• It's not hard to meet expenses ... they're everywhere.

• The only difference between a rut and a grave is the depth.

Thanks to the January 2000 issue of X-MIT-TER, published by the Penn Wireless Association.

### Giggle Hertz: Hussy

An old man and his wife lived deep in the hills and seldom saw many people. One day, a peddler came by to sell his goods and asked the man if he or his wife wanted to buy anything.

"Well, my wife ain't home, she's gone down to the creek to wash clothes, but lemme see what you got," said the man.

The peddler showed him pots and pans, tools and gadgets, but the old man wasn't interested.

Then the man spotted a mirror and said, "What's that?"

Before the peddler could tell him it was a mirror, the old man picked it up and said, "My gosh, how'd you get a picture of my pappy?"

The old man was so happy, he traded his wife's best pitcher for it. The peddler left before the wife came back and spoiled his sale.

The old man was worried that the wife would be mad at him for trading her best pitcher, so he hid it in the barn behind some boxes of junk.

He would go out to the barn two or three times a day to look at the "picture," and eventually the wife got suspicious.

One day she got fed up, and after he retired for the night, she went out to the barn. She saw the mirror behind the boxes, picked it up, and said, "So this is the hussy he's been foolin' around with!"

Thanks to the June 2002 Radio Flyer, the UBET ARC newsletter.

### Are You Electrosensitive?

That is, are you one of those people who is unusually sensitive to radio frequency fields? Well, a group called the Cellular Phone Taskforce

Continued on page 62

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# LETTERS

## From the Ham Shack

**Art Housholder K9TRG.** OK, Wayne, I read your April issue editorial and I can't agree more ... I'll start the ball rolling with a couple of ham radio-related stories for you.

As you know, we have both traveled extensively. Sometimes together on the same flight. How many times have we been together on flights to the Far East for the electronics shows in Japan, Korea, Taiwan, Hong Kong, etc.?

Operating "air mobile" with an HT, with the captain's permission of course, always made the trips more exciting, and the time most certainly passed quicker — especially on those 12- to 16-hour flights. I admit HT contacts going east to Europe don't last long after you leave the U.S. coastline. However, going west from Chicago to the Far East is another story. Most of my flights have been nonstop from Chicago — that means the "polar route." This gives me a lot more time over land all the way from Chicago to Alaska, and creates a lot more opportunities for contacts. A few of the more memorable contacts were from Glasgow, Scotland, at 40,000 feet, to the "Feldtbach" repeater outside of Frankfurt. The reason that the contact was always from Scotland was that it was illegal to operate any transmitter not certified as an aircraft radio from any airplane, even if you owned the aircraft. Many pleasurable contacts were made into France, Germany, Holland, etc.

Another one was from northeast of Hudson Bay to my friend Al Amster in Cleveland, Ohio. In both of these cases we were always flying "to" the stations worked, and a 40,000-foot antenna in the cockpit looking right at the stations sure helped.

Wayne, I'm sure that you remember that I do have written permission from a major airline to operate on their airplanes. Most of the airlines honor the letter as it is from one of the major airlines. As far as I know, it is the only one ever issued. Now, with the 9/11 incident behind us, I haven't even asked. If permission were granted it might be upsetting to a few passengers, and none of us needs this on current flights.

Before I get umpty thousand letters asking how to get a letter such as this, part of the agreement was that I would not tell how it can be done. They did not want umpty thousand other hams knocking on their door for the same thing. And now with the "9/11" issue, I'm not sure it could be done at all. Sorry ...

A few years ago I made an RTW, "Round the World in 80 Days" flight. On this trip, I also had cockpit privileges and use of the VHF and HF frequency radios. I was more interested in making my video documentary at the time, and ham operating time was minimal. I did manage to get all of the take-offs and landings on videotape, all the way around the world.

One unique "side ham story" that goes with this is kind of interesting.

I show the video program at many ham radio club meetings, CAP groups, nursing homes, "careers" days for schools, and also for other groups. At one ham club meeting of about 100 guests, I was giving my five to ten minute talk about what they were going to see before starting the tape. I was telling about the cockpit privileges, etc., when this gray-haired gentleman stood up and said, "Art, I don't know what kind of #\$\$%^\$ you are trying to feed these people, but I have been a captain for 25 years and you can't tell me that you got permission to ride in the cockpit."

I always come prepared for this kind of people, as it has happened before. I reached in my jacket pocket and said, "Captain, would you mind stepping up here for a moment?" As he approached I unfolded "THE LETTER," and said "Captain, I hope that you will help me keep my word with the airline and that you will not read out loud the signature on this letter nor divulge it in the future."

He took one look at the letterhead and the signature, turned on his heel, and stormed out. I love this kind of people.

**Robert Harder WB8ILL.** In response to Steve Nowak KE8YN's "On the Go" in April 2002. First of all, I did not read or hear about any proposals to establish an emergency communications service (ECS) somewhat along the lines of the National Guard. But in these times a lot of ideas are being floated around, some good and some bad.

My first thought about this idea is that it may be a good idea. We should be positive about it. It is a chance for amateur radio to become "officially" part of national and local disaster plans.

You are correct that most people do not know that we exist. Those that have heard the term "amateur radio" don't know anything substantive about it. At best, you get

the question "Do you mean CB?" At worst, you are correct in that we are the guys who mess up TVs.

One of the reasons we are not known to the general public is we are a very inefficient "publicity machine." We (at least so far) are not in a business like charities or labor unions whose very existence relies on ever increasing numbers of members.

I also believe we are not known to the public service agencies for the most part because these agencies are tax-supported bureaucracies. First, their goal is to get as many tax-supported employees under their jurisdiction as possible. Volunteerism is discouraged. Ham radio operators are prohibited from accepting any remuneration for their services.

Second, any amateur radio volunteers are considered only as interference with normal operations. I call this the arrogance by these agencies. In these days of all communication being digitally encoded, the fewer the people who know what is going on, the better.

From what I have read over the years, where amateur radio has been successfully integrated into police departments, fire departments, and other public safety organizations, it has taken a tremendous amount of work by local hams or there has been some key person who has been instrumental, such as a high-ranking officer or politician being a ham.

Currently, being a member of RACES or ARES does not mean a whole lot. For the most part, in times of disaster, a RACES identification card is no more valuable than a K-Mart coupon in gaining access to disaster areas to provide assistance. Most official personnel (police, fire, etc.) have no idea what RACES is.

We, the amateur radio community, should support this proposed ECS. Amateur radio operators would serve as the core of this group. For the most part, we already have the communication skills. We would most likely need some standardized federal training in handling disasters. Maybe a "disaster certification" could be added to our current FCC licenses and be a requirement to be an ECS member.

Most important, local governments need to be required to include the ECS in their disaster plans. This would give the ECS "official" standing. Every policeman and

*Continued on page 62*



# Amplifier Testbench Report

*Here's a look at broadband amps that's packed with useful insight.*

*Like many home-brewers, I've squirreled away interesting schematics for years. When I recently needed a broadband receiver amplifier covering 3–30 MHz, I found a dozen or so ideas in my files. This article presents the best nine amplifiers that I built and evaluated. While my purpose was a receiving amplifier, these designs could be used as low-level transmitter stages as well.*

Using some scrap aluminum. I made a simple test fixture to hold a 1-3/8" x 2-1/4" piece of PC board stock. I built each amplifier on a separate piece of PC stock and mounted it in the test fixture for performance measurements. I find that Manhattan-style construction is rapid and low-cost, so that's what I used for these amplifiers. Manhattan-style construction is well described at K7QO's Web site [<http://www.qsl.net/k7qo/manhat.htm>].

These are very simple projects. The

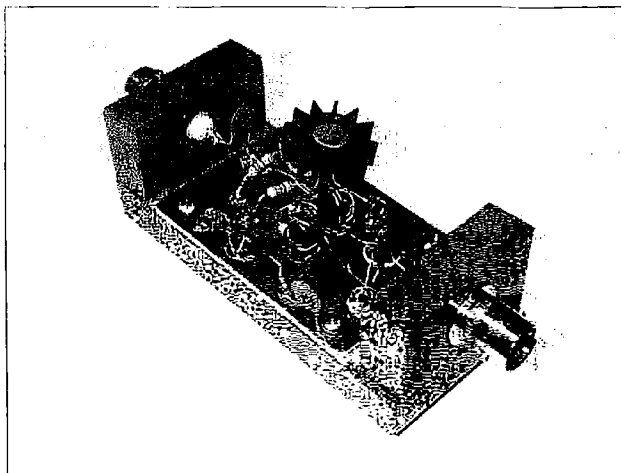
most complicated one shouldn't take more than an hour to build, and most took me less than 30 minutes.

## Performance measurements and summary

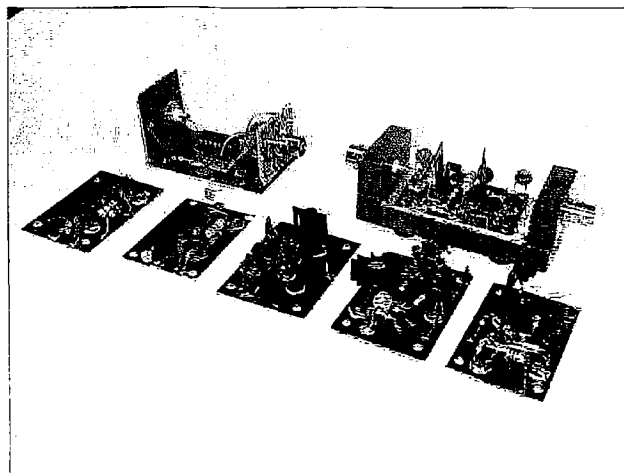
The key performance characteristics of each amplifier are presented in **Table 1**. I'll briefly describe each of the data categories that I measured. An excellent introduction to these parameters is found in Watkins Johnson Communication's Tech-note "High

Dynamic Range Receiver Parameters." It's available on WJ's Web site at [<http://www.wj.com/pdf/technotes/HighDynRangeRec.pdf>].

- Midband gain — the power gain of the amplifier, measured at 5.0 MHz
- -3 dB Frequency — the high frequency at which the gain of the amplifier drops 3 dB below the midband gain. Since I was not interested in low frequency performance, I didn't measure the low-frequency 3 dB point; all were flat down to 3 MHz, the lowest frequency I was interested in. However,



**Photo A.** Test fixture and sample Manhattan-style amplifier.



**Photo B.** Some of the evaluation amplifiers built by the author.



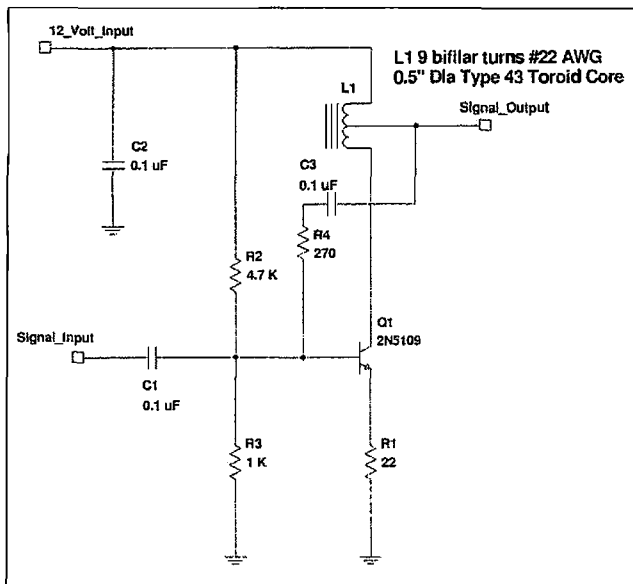


Fig. 1. Classic 2N5109.

casual checks show that most of these designs perform well down to 100 kHz or lower.

• Input IP2 and Output IP2 — second-order intermodulation intercept point, measured with respect to the second harmonic of a 5 MHz signal. Input IP2 is referenced to the input signal, while Output IP2 is referenced to the output signal level. Output IP2 = Input IP2 + midband gain.

• Input IP3 and Output IP3 — third-order intermodulation intercept point, measured with two equal-level input signals of 5.0 and 6.0 MHz. Input IP3 is referenced to the input signal, while Output IP3 is referenced to the output signal level. Output IP3 = Input IP3 + midband gain.

• Output power (1 dB compression) — a perfect amplifier shows the same gain, regardless of input signal level; real amplifiers can't increase power past some certain level. The 1 dB compression point is the amplifier output power at which the gain drops 1 dB from the low-level gain.

• Noise figure — the noise figure represents the excess noise added by the amplifier. For the 3–30 MHz

range, and normal antennas, atmospheric noise is the dominant factor, and achieving a low noise figure is often not critical.

• Input VSWR — the worst-case VSWR of the amplifier input over the 3–30 MHz range.

• Spurious-Free Dynamic Range — this is a single measure attempting to capture the total amplifier performance. Watkins Johnson describes it as "that portion of the total dynamic range where there are no 3rd order spurious responses exceeding the noise floor by 3 dB when two equal-power input signals are applied." I've calculated the SFDR based on a typical voice SSB bandwidth, using

Continued on page 12

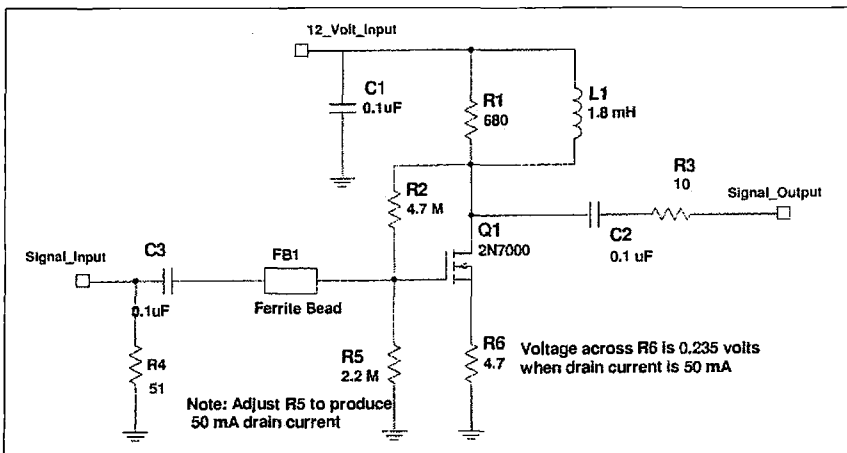


Fig. 2. 2N7000.

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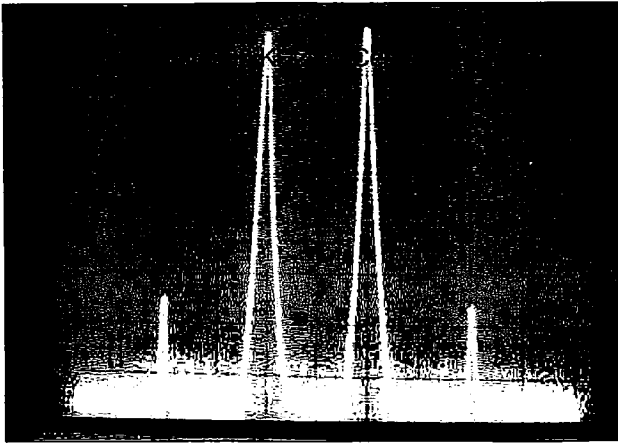
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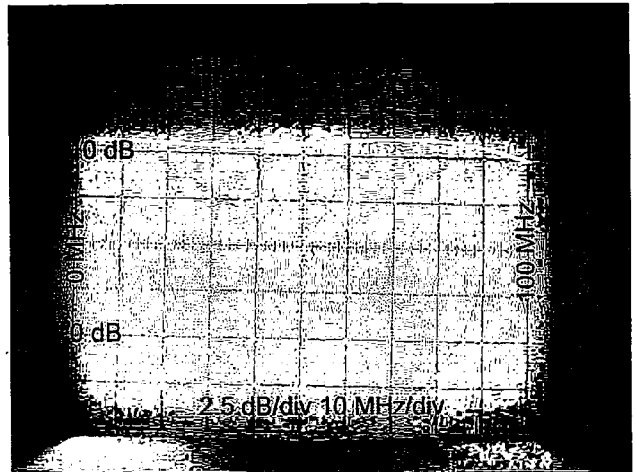
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**Photo C.** Intermodulation test of 2N5109 amplifier showing intermodulation products down 56 dB from  $-4$  dBm input.



**Photo D.** Typical gain versus frequency sweep (2N5109 amplifier).

## Amplifier Testbench Report

*continued from page 11*

the measured performance data for each amplifier.

I've shown signal levels in dBm, or decibels below one milliwatt power, referenced to 50 ohms. I've taken reasonable care in making these measurements, and used professional quality test equipment. Still, many of these parameters are level-sensitive, so use the data with some degree of caution when comparing with other sources of information.

### Which one to use?

Each of these amplifiers has a purpose. For a receiver preamplifier, my favorites are the classic 2N5109 or the newer NE461M02 amplifiers. If you are looking for pure simplicity, the

MAR MMIC amplifiers are hard to beat, particularly if you have a controlled signal environment, such as a low-level stage in a transmitter. For minimum noise figure, a J310 in grounded gate is the clear choice, and it's an excellent performer by all other standards as well.

I've not been concerned with performance beyond 30 MHz in these amplifiers. Some of these designs will work into the GHz range, if you use proper construction practices and appropriate components. Even with normal leaded components and sloppy breadboarding practices, performance well beyond 500 MHz is possible with some of these amplifiers.

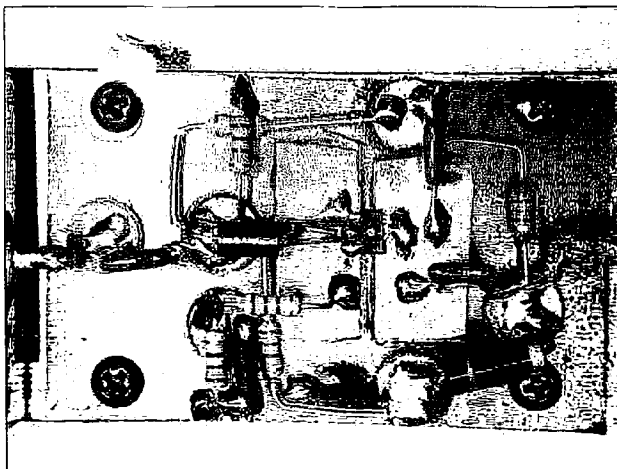
### Classic 2N5109

Drake used this design as the RF

preamplifier stage in its late-1970s R7 receiver. Slight variants of it appear in several books by Doug DeMaw, including his 1990 *W1FB's Design Notebook*. Regardless of the originator, it's still an impressive performer, clocking in the best spurious free dynamic range, IP3, and IP2 values of the amplifiers I built, and offering a decent noise figure as well.

The design is a simple common emitter amplifier, with an unbypassed emitter resistor to add degeneration. Transistor selection is important, and the 2N5109 was developed for CATV applications where gain linearity and intermodulation control are critical.

R4 provides significant negative feedback, which both reduces the input impedance to 50 ohms and flattens the gain versus frequency response. Indeed,



**Photo E.** Mounting the SMD transistor in a Manhattan breadboard.



**Photo F.** MMICs are tiny. The MMIC is the tiny round device with four leads.



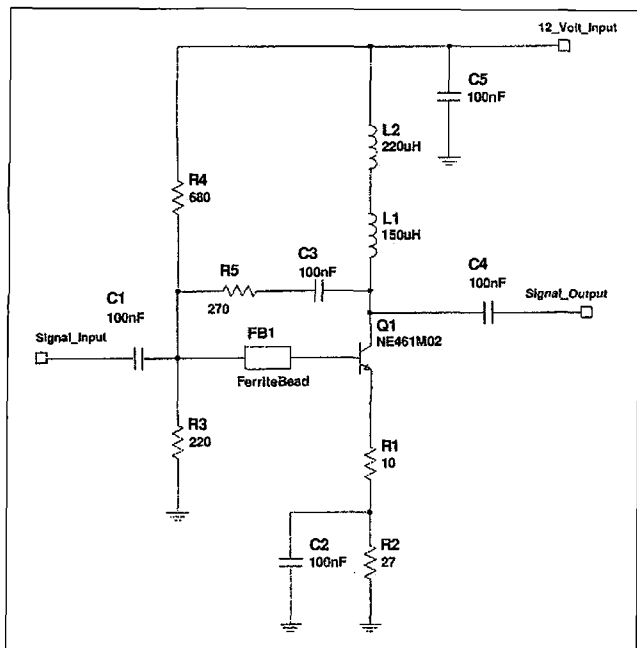


Fig. 3. HF1000 preamp.

the input VSWR is remarkably good throughout the 3–30 MHz range. I used a 0.1  $\mu$ F input coupling capacitor to extend the low frequency response below 100 kHz. Drake used a 0.005  $\mu$ F coupling capacitor to roll off strong broadcast signals. If you are not interested in gain below 3 MHz, use 0.005  $\mu$ F.

The output is connected to the collector through an autotransformer, shown as L1 in the schematic. Drake doesn't specify L1 other than by a part number, but it appears to be around 9 bifilar turns wound on a 0.5-inch-diameter toroid using a high  $\mu$  material. I used 9 bifilar turns of #22 AWG wire

an interesting low-frequency MOSFET preamp using a VN10KM device [http://www.qsl.net/wa1ion/bbva/bbva\_af1.gif]. I've modified WA1ION's design to use the common 2N7000 enhancement MOSFET.

R4 provides a 50-ohm termination to the signal source. Ferrite bead FB1 is a "stopper" to prevent self-oscillation. R2 and R3 provide bias to the 2N7000. Note that R2 is connected to the drain, not the 12-volt supply, thus providing some negative feedback. The output is connected directly to the drain, with

Continued on page 14

wound over a Fair-Rite 5943000301 (FT50-43) core.

The 2N5109 draws around 50 to 60 mA current, and should be equipped with a clip-on heat sink. Slightly better intermodulation performance will be seen with a 13.8 volt supply instead of 12 volts.

## 2N7000

MOSFETs are also candidates for linear amplification of strong signals. WA1ION's Internet site describes

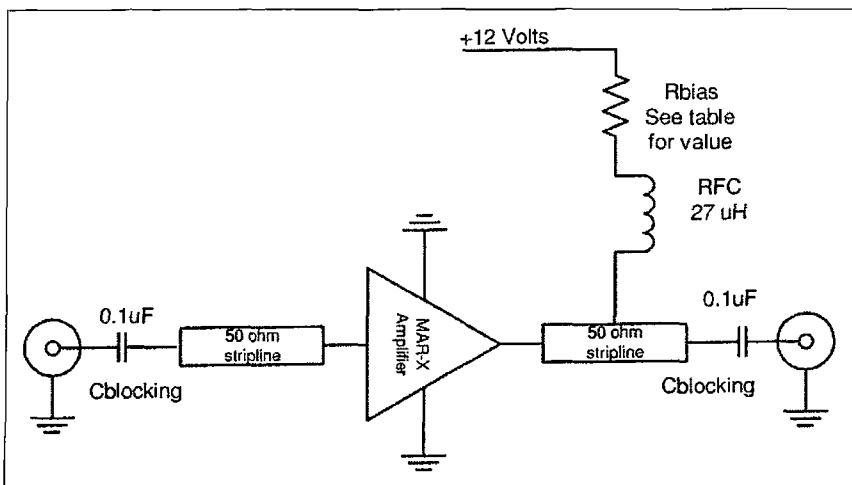


Fig. 4. Generic MMIC amplifier.

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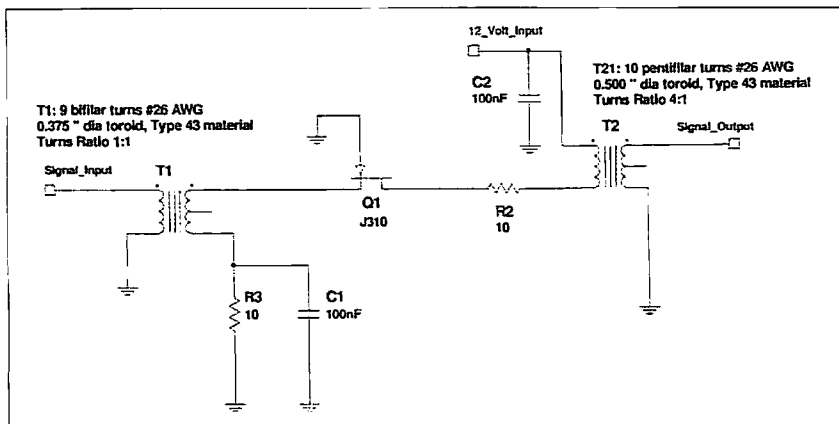


Fig. 5. J310 grounded gate.

## Amplifier Testbench Report

*continued from page 13*

R3 protecting Q1 should the output be short-circuited.

MOSFET devices are not well controlled for gate threshold voltage, so it will likely be necessary for you to select R5 to obtain the target 50 mA drain current. Start with 2.2 megs and measure the current draw. If it is below 50 mA, increase R5; if it exceeds 50 mA, decrease R5. Once established, the drain current will be stable, so this is a set-once-and-forget task, assuming Q1 isn't replaced.

At the recommended 50 mA drain current, Q1 will dissipate around 600 milliwatts, which exceeds the device rating. I use a slip-on heat sink and have not had a problem with 2N7000

failures. If you wish to run Q1 within its ratings, adjust R5 to 20 mA. A heat sink is still a good idea, however. Operating Q1 at 20 mA will slightly reduce the intermodulation performance of the amplifier.

## Watkins-Johnson HF1000 preamp

The preamplifier stage in Watkins-Johnson's HF1000 receiver has a familial resemblance to Drake's R7 design. However, WJ opted for direct coupling from the transistor collector and used a more modern transistor. WJ used a hard-to-find Philips BFQ19 surface-mount microwave NPN transistor, with an  $f_t$  of 5 GHz. I substituted a similar device from NEC, a surface-mount NE461M02/2SC5337, available from Mouser Electronics for

\$1.71. I also made a few other changes in WJ's design to reflect its use as a stand-alone amplifier.

Using a GHz-range microwave transistor for a 3–30 MHz preamplifier is certainly overkill, but it turns out that the 2-watt NE461M02 is about half the price of the lower-frequency 2N5109.

Instead of transformer coupling, this design directly feeds the 50-ohm output. Otherwise, it's quite similar to Drake's R7 design.

Breadboarding the NE461 is possible with a bit of care. The collector tab is designed to be directly soldered to a pad. Since the transistor dissipates nearly 1 watt, it's important to have a large copper area for the collector to act as a heatsink. Staying with the Manhattan-style construction technique, I cut a rectangular piece of PC stock about 1/2" x 3/4", and then super-glued it to the base PC board, and soldered the transistor's collector tab to it. I used a similar-size piece of PC stock for the emitter tab. This technique introduces several picofarads of stray capacitance from the collector and emitter to ground. Computer simulation of the design showed that the stray capacitance in my breadboard technique reduces the 3 dB bandwidth from over 500 MHz to about 100 MHz. So, if you are interested in a very broadband amplifier using this circuit, you should use a construction technique that minimizes stray capacitance, such as mounting the collector PC board vertically, or removing the ground plane underneath the collector pad.

This was the only circuit that was unstable when first built, with a strong parasitic oscillation around 1.3 GHz. A ferrite bead in series with the base lead stopped the parasitic but further decreases the 3 dB bandwidth.

## Three MMIC amplifiers

MMICs (monolithic microwave integrated circuits) are deceptively simple. A MMIC is a tiny integrated circuit that offers a 50-ohm input and output impedance. With fewer than 10 parts, you can build an MMIC amplifier that offers flat gain from DC through the GHz range. No wideband transformers

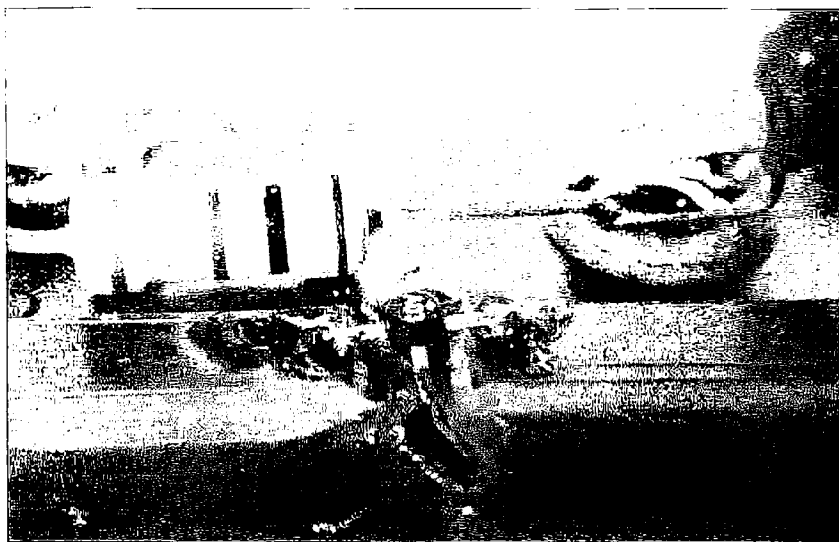


Photo G. MAR-3 amplifier in the test fixture, showing Manhattan construction, including strip lines.



to wind; no complicated impedance matching.

A wide variety of MMICs is available from many manufacturers, and I tested three from among the nearly three dozen offered by Mini-Circuits Laboratories [<http://www.minicircuits.com>]. The MAR-1 through MAR-8 series is the original MMIC offering by Mini-Circuits; these are widely available at prices in the \$1 to \$2 range. Hence, I built test amplifiers with MAR-3, MAR-6, and MAR-8 MMICs, representing low, medium, and high gain chips. The MAR-series chips don't represent state-of-the-art in MMIC performance, but remain quite useful for HF through low UHF experimentation. (The leaded MAR-X series has recently been replaced by surface mount MAR-XSM packages. The device specifications important for HF use, however, have not materially changed, and the older leaded packages continue to be available on the surplus market.)

If you are to achieve decent performance in the GHz-plus range, you will need to pay careful attention to layout, component choice, and printed circuit board material. I was interested only in amplifiers up to 30 MHz or so, and I was able to get away with less-than-optimum construction techniques and components. Even so, the Manhattan-style construction I used worked reasonably well beyond 500 MHz. (The MAR-6 amplifier, I built from a kit.)

The MAR chips contain built-in bias elements, and both the input and output are at a positive DC voltage with respect to ground. Hence, both input and output require a blocking capacitor,  $C_{\text{blocking}}$ . I used 0.1  $\mu\text{F}$  disc ceramics. (Good low-inductance surface-mount chip capacitors should be used if UHF performance is desired.) I used an 8.2  $\mu\text{H}$  RF choke in addition to the bias resistor. The MAR chips require, depending on the particular model, between 3.5 and 7.8 volts, and must be run from a higher supply voltage through a series bias resistor,  $R_{\text{bias}}$ . If you don't use an RFC,  $R_{\text{bias}}$  shunts the output, so you will lose some gain — typically 1 to 2 dB. If you use a common leaded RFC, expect to see a dB or so of gain ripple

over the 3–100 MHz range caused by choke resonances. Omitting the RFC will give almost ruler-straight (but lower) gain versus frequency over this range. If you use a choke, it should provide at least 500 ohms reactance at the lowest frequency of interest. For the 3–30 MHz range, the RFC should be at least 27  $\mu\text{H}$ . (Special, resonance-free chokes are available where both

maximum gain and maximum flatness are important.)

It's important to have a good ground plane for MMICs, and the Manhattan-style construction helps in this regard. I made the input and output connections with 50-ohm strip line. For standard 0.062-inch glass epoxy PC board material, the trace width for 50-ohm strip line is 0.158 inches. I just milled

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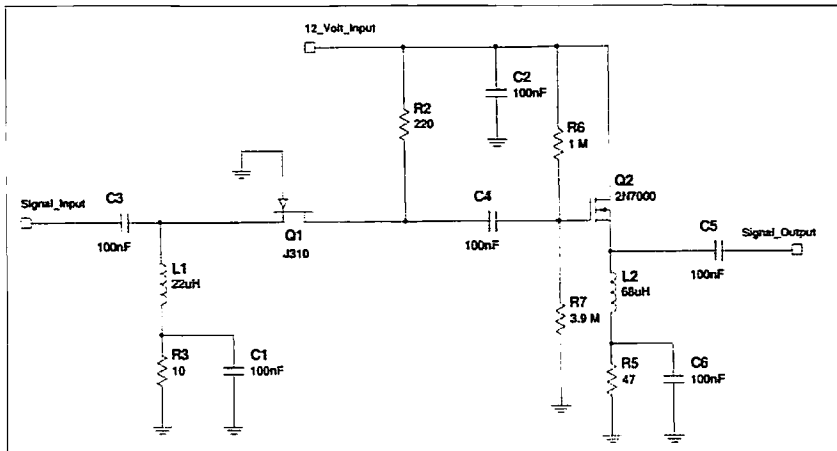


Fig. 6. J310 grounded gate and 2N7000 source follower.

a sliver of scrap PC stock to 0.158-inch width and Super-glued it just as if it were a Manhattan-style pad. This approach makes the MMIC stick up above the board surface, so the two ground leads are longer than desired. For HF use, strip line construction is not necessary. Remember, however, that MMICs have gain well into the GHz range, and sloppy layout could yield an oscillator, not an amplifier. Use a good ground plane and layout to keep the output clean. I did not see any indication of oscillation up through 1.5 GHz in my test circuits.

It's good practice to connect an amplifier in the following sequence: first, connect the output; second, connect the power ground; third, connect the power positive; and last, connect the

amplifier input. I didn't follow this sequence as carefully as I should, and consequently destroyed two MMICs while running tests.

### J310 grounded gate

Grounded-gate FET amplifiers have a good reputation for low noise performance, and the J310 circuit doesn't disappoint in this regard, turning in the best noise figure of the amplifiers I built.

The input impedance of a J310 in grounded-gate configuration is close to 50 ohms, so the input transformer should have a 1:1 turns ratio. Since the output transformer primary carries the same signal current as the secondary of the input transformer and we have designed for 50-ohm impedance at

both the input and output, the voltage gain of this amplifier is simply the ratio of the transformer turns. In this case, T2's primary has a turns ratio of 4:1; hence the theoretical voltage gain is 4, or 12 dB. (The impedance of the output 50-ohm load seen by Q1's drain transformed by T2 is 800 ohms. This gives a voltage gain of 16:1. However, T2 has a 4:1 voltage step-down ratio. Hence the net voltage gain into the 50-ohm output is 4:1.) T1 and T2 carry the DC drain current as well; thus some care should be taken to avoid core saturation, particularly with T2. The size cores suggested on the schematic are satisfactory. (A no-transformer version of the grounded-gate J310 is shown later.)

This is a good-performing amplifier with a very good noise figure, but a disappointing high frequency response. Computer simulation suggests that the upper 3 dB frequency corner should be nearly 100 MHz. I was unable to coax the high frequency response past 21 MHz, despite extensive experiments with different output transformer designs.

### J310 grounded gate and 2N7000 follower

With a little extra work, we can eliminate the transformers from the J310 grounded gate amplifier.

The input transformer can easily be replaced with an appropriate RFC and blocking capacitor. The RFC carries the DC current, but looks like high impedance to the RF input. C3 blocks the DC from the signal input.

We can replace the output transformer with a load resistance, R2. Since the same signal current flows through R2 and the input source, the voltage gain is the ratio of R2 to the 50-ohm input source, or, for the 220-ohm resistor in my design, 4.4:1, or 12.8 dB.

To connect the amplified signal to the 50-ohm output, we can use a source follower. A source follower has high input impedance and low output impedance and thus efficiently couples the signal amplified by Q1 to a 50-ohm output port. Our test circuit uses a 2N7000 MOSFET follower. A source follower has a voltage gain slightly

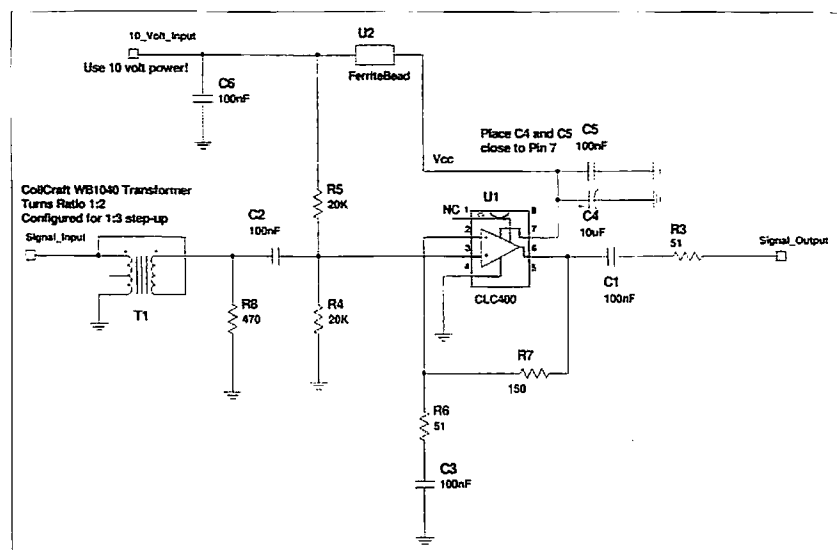


Fig. 7. CLC400 high-speed op amp.



Amplifier Configuration	5 MHz Gain (dB)	-3 dB Frequency (MHz)	Input IP2 (dBm)	Input IP3 (dBm)	Output Power dBm (1 dB Comp)	Noise Figure (dB)	3-30 MHz Input VSWR (max.)	Output IP2 (dBm)	Output IP3 (dBm)	Spurious Free Dynamic Range (dB)
2N5109	11	125	56	33	24	5.8	1.22:1	67	44	109
2N7000	13	34	36	23	26	8.4	1.50:1	49	36	101
J310 & 2N7000	11	62	44	23	24	7.1	1.29:1	55	34	101
J310 GG High Gain	10	21	55	28	20	4.2	1.29:1	65	38	107
MAR-3	12	500	25	12	12	7.3	1.29:1	37	24	94
MAR-6	15	340	-10	-7	-5	2.4	3.00:1	5	7	84
MAR-8	30	430	-4	-3	12	3.5	1.92:1	26	26	86
NE461M02	10	100	30	28	24	5.5	1.25:1	40	38	106
CLC400	15	88	51	16	17	8.7	1.62:1	66	31	96

Table 1. Summary performance table.

less than unity, so the net expected gain is close to 12 dB.

Because MOSFETs are poorly controlled for threshold voltage, you may find it necessary to adjust R7 to yield around 6 volts at Q2's source. R5 should be a 2-watt component, as it dissipates nearly three-quarters of a watt. This particular circuit runs Q2's dissipation somewhat exceeding its rated value. I use a small clip-on heat sink and have not found problems with device reliability.

Pairing the grounded gate input amplifier with a source follower markedly improves the high frequency response over the transformer-coupled grounded gate J310, but with a worse noise figure.

### CLC400 current feedback op amp

National Semiconductor's high-speed current feedback op amp series has interesting applications for wideband RF amplifiers. Anyone interested in these

chips should visit National Semiconductor's Web site [<http://www.national.com>] and download data sheets for members of the CLC family of chips and an excellent series of related Application Notes. In particular, Application Notes OA-7, OA-11, and OA-14 are instructive.

Using a high-speed op amp as an RF amplifier usually exposes an unimpressive noise figure. However, National provides an innovative solution to the noise problem, and I built a 15 dB gain amplifier using a CLC400 chip following the prototype in Application Note OA-14. Some members of the CLC4XX family have higher gain or lower noise figures than the CLC400, so pick the particular amplifier you need to match your requirements.

The circuit has several points of interest. I'll hit the highlights, but a detailed study of National's Application Notes is well worth the time invested.

The key to improving the noise figure is an input step-up transformer; by

judicious selection of a step-up ratio, it's possible to balance noise voltage and noise current contributions in the amplifier. I used a CoilCraft WB1040 1:2 broadband transformer, configured as an autotransformer, to yield a 1:3 voltage step-up. R8 terminates T1 to match the input to 50 ohms. A 1:4 transformer would yield a better noise figure, and additional gain. With a 1:4 transformer, R8 should be changed to 820 ohms. You could, of course, wind your own transformer; 10 quadrafilar turns on a 0.375-inch diameter ferrite toroid using type 43 material should be suitable.

The voltage gain  $A_v$  of the amplifier is determined by the ratio of R7 and R6 in the following formula:  $A_v = (1+R7/R6)$ . Keep the sum of R6 and R7 to be at least 200 ohms, however, as this feedback divider shunts the amplifier output.

Op amps don't like capacitive loads, and R3 is essential to preserve stability when feeding a 50-ohm coaxial cable. Unfortunately, R3 throws away 6 dB of the amplifier's gain, as it forms a voltage divider with the output load. If you were using a CLC400 to directly drive a 50-ohm mixer, for example, through an inch of wire, R3 could likely be omitted and the additional gain recovered. But, as a stand-alone preamplifier to be connected to a receiver through even a short length of coaxial cable, R3 is essential.

Op amps are most often used with

Model	Typical HF Gain (dB)	Max. Frequency (GHz)	Max. Output Power (dBm) @ 1 dB Compression	Noise Figure (dB)	Output IP3 (dBm)	Bias Resistor +12VDC (Ohms)
MAR-1	18.5	1	+1.5	5.5	+14.0	470
MAR-2	12.5	2	+4.5	6.5	+17.0	270
MAR-3	12.5	2	+10.0	6	+23.0	200
MAR-4	8.3	1	+12.5	6.5	+25.5	150
MAR-6	20	2	+2.0	3	+14.5	560
MAR-7	13.5	2	+5.5	5	+19.0	390
MAR-8	32.5	1	+12.5	3.3	+27.0	120

Table 2. MAR amplifier specifications.

Continued on page 58



# 2 m/70 cm Quad Revisited — Part 2

*Try out this new, improved update to a CQ article (July 1999).*

*Now that you have an excellent antenna, we need to move on to the feedline, rotor, and whatever else is needed to make a complete VHF/UHF antenna system.*

Well, it is obvious that we do not need any \$500 rotor system to turn this little light antenna. We have all seen those used — sometimes well-used Alliance Mfg. TV antenna rotors from the '50s and '60s era. The price is usually two to five dollars for the rotor section and about one or two dollars for the control units.

That might seem like an ideal solution for rotating our quad system, but first let us look at the biggest problem faced by the VHF/UHF folks: transmission power line loss. Coax feedline has many times more losses at 100 feet

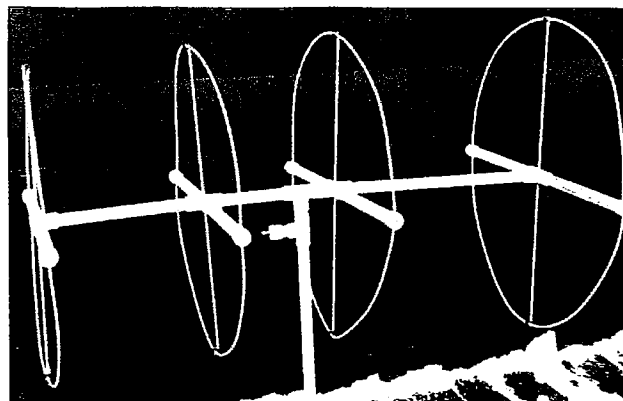
than, say, a good 300-ohm ladder line. However, the matching is much simpler. Yep! It is one of those trade-offs again. Nowadays, coax manufacturers make 1.000 MHz RG-6 75-ohm satellite receiver coax, which is about as good as it gets, and no problem at about fifteen cents per foot. So we can use up to about 100 feet without worry in the VHF/UHF range.

I am a believer that the antenna system should be located as close as possible to the ham shack to minimize the transmission line loss problems. I always use an odd multiple of one-half electrical line lengths, 7 feet in our

case, to minimize the SWR problems. So you can see where 50-ft. and 100-ft. lengths look good! My Kenwood TS-780S puts out 20 watts RF when loading a 50-ohm resistive load. I have found that hybrid modules used in most transceivers can handle 75-ohm coax with very little SWR problem, and you still get full RF output. It is that stray inductance that the modules do not like! I have never been a believer in using two 100-watt "blocks" and a huge DC power supply to run them just to get 20 watts up at the antenna. The home-brew of a 4CX300 high voltage linear amplifier does not



**Photo A.** Rotor, cable, and control box assembly.



**Photo B.** Another shot of the finished quad from Part 1.



interest me much either! (I might try a project like that sometime in the future for those folks who think they really need one.)

I went to a couple of summertime ham flea market affairs and started looking for those crusty old TV rotors. They were there, and in big numbers. Seems like the new folks do not know what to do with them. Anyway, I started looking at rotors, since they are the hardest to find in good condition. I found a couple in the two- or three-dollar-each class, and purchased them. I then looked at the rotor case to check the stamped model number so that I could find the compatible control boxes. The control boxes are many, and usually run in the one- to two-dollar class. Purchase several just to make sure you have good parts if needed.

I found an old model T-45 rotor that

was in like-new condition. I looked for the matching control box and found three of them for one dollar each. Such a deal! When I got them home and opened up the rotor, I was amazed. Almost like a mirror inside. I cleaned the insides of gear grease and checked everything out.

Take an old 24 VAC filament transformer and connect it to the motor wires to see if you hear a growl. Usually you will, since these motors are almost never bad. Then take one of the control boxes and check it out with a voltmeter. If everything looks good, plug it in to the 120 VAC power line. You should get 24 to 30 VAC when activated. Do the wire hookup to the rotor and see if you get action.

If the motor does not go with AC voltage on it, usually this means the start capacitor is bad. Among the two or three control units you purchased, you will have a good capacitor. It is the large white capacitor located in the control box, 100  $\mu$ F, 30 VAC. Yes! I did say AC. If you had to, you could use a 100 VDC replacement capacitor. Once you have a working rotor system, you can swap parts off of the other controls to get the best-looking control. Sometimes the meters are bad, so make sure you have one that looks good and works. You do want to know what direction the antenna is in.

Open the rotor housing again. Purchase some electronic white grease or garage door opener white grease to lubricate the gears and slip bearings of the rotor. This is a light lubricant which has a low temperature rating and will not turn into cement on those cold nights. You might want to put a little zinc oxide primer paint, spray can of course, on the rotor housing, and finish with a coat of enamel paint. No rusting or oxidizing after that. I do recommend replacing the rotor screw terminal screws with #6-32 stainless steel machine screws. This will keep you out of trouble in the future. I have also used a male and female DIN-8 plug/socket system in-line so that I could have quick disconnect of the rotor line should I ever want to remove the antenna or rotor for repairs. PVC black tape weatherizes the connectors.

I recommend purchasing the eight-conductor light-duty black rotor cable. Anything beyond that is just a waste of money unless you have another suitable cable on hand. The cable has two AWG-18 conductors for the motor voltage and six AWG-22 conductors that provide the servo indicator job. This cable usually costs under twenty cents per foot when purchased new.

I have a roof mounting using two-inch PVC pipe and caps with stainless wood screws. I run the cable to the mounting using one-half-inch PVC (gray) pipe clamps and drywall screws. This system works for bringing the coax and rotor cables to the shack. Two couplings and a small piece of PVC pipe make a good wall entry for the cables. Use clear 100% silicone caulk to backfill and weatherize the entry.

Well, that is about it for this project. Remember, if using satellites you will need a second rotor system to elevate the antenna in the "Z" axis. You will need elevation to track those guys!

If there are any questions, I am available via USPS only, and only if I receive an SASE. Good luck! 73

Qty.	Item	Source	Cost
30 ft.	AWG-14 bare copper wire	Any	\$1.20
1	Ferrite clamp-on RF choke	TDK via Hosfelt #80-267	\$1.00
12 ft.	0.75 in. PVC water pipe	Any	\$3.00
4	0.75 in. PVC "T" fitting	Any	\$2.00
2	0.75 in. PVC cross fitting	Any	\$2.00
8	0.75 in. PVC pipe caps	Any	\$2.00
30 ft.	0.25 in. PVA agricultural clear tubing	Any	\$3.00
2	Female type F coax connector	Hosfelt #60-342	\$ .50
1	Double female bulkhead type F	Hosfelt #FC-67	\$ .50
50 ft.	RG-6 Sat TV 75 ohm coax	Hosfelt #60-236	\$7.50
Alt.	RG-59/U Alpha #1354 75 ohm coax	Hosfelt #60-506	—
Optional: 24	SS #4-025 sheet metal screws	—	—
Alt.	PVC glue and solvent/cleaner	—	—
Optional: 4	0.25 in. x 36 in. wood dowels	Local	\$1.20
Optional: 8	#4 0.75 in SS camhead philips sheet metal screws	—	—
Optional: 8	0.25 in. coax cable strips for connectors	—	—

Table 1. Parts list.

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*A simple, inexpensive alternative for interfacing real-time, home-brewed applications to the PC.*

*Like many of you, I enjoy tinkering with electronic projects. Over the years, my projects have progressed from simple analog circuits to complex designs incorporating various forms of digital control. One of the most frustrating hurdles faced along the way was the lack of a simple method to test the digital interface.*

A personal computer seemed to be the ideal candidate for the job. Unfortunately, interfacing to standard serial communication (COM) and parallel (LPT) ports was often frustrating considering the hardware and software constraints. The remainder of this article details the theory and construction of a general-purpose input/output (GPIO) card for IBM ISA/EISA bus-compatible systems. The GPIO provides a simple, inexpensive method for interfacing real time, home-brewed applications to the PC and is intended as an alternative to existing COM and LPT ports. Parts for the card, including the homemade printed circuit board, cost about \$10.

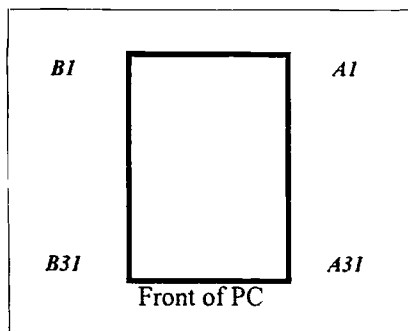


Fig. 1. ISA connector layout.

The GPIO provides all of the address decoding and bus buffering required to equip an ISA/EISA-compatible PC with 24, independently controllable external I/O lines.

## Technical background

The majority of IBM PC-, XT-, AT-compatible personal computers, with the exception of the IBM PS/2, utilize the "Industry Standard Architecture" (ISA) bus structure for the addition of feature cards. The ISA connector is detailed in Fig. 1 and associated signals are defined in Table 1. The original PC and XT versions incorporated 8-bit processors. A single, dual-in-line, 62-pin connector is specified which provides access to 20 address lines, 8 data bits, power supplies, and control lines. The advent of the AT platform prompted an expansion of the original ISA bus, formally referred to as "Extended Industry Standard Architecture" (EISA), to accommodate the 16 data bits and 24 address lines of the 286 processor. Compatibility is maintained with existing ISA hardware by means of a secondary connector rather than changes to the original bus structure. Three minor changes were made,

none of which significantly affect the structure.

Application boards connected to the IBM expansion bus should also comply with the following guidelines to prevent interference with other resident hardware:

1. No more than (2) TTL-LS loads attached to any given bus line.
2. NMOS, LSI components should be buffered from the connector as they can neither supply sufficient drive to the bus nor tolerate the negative spikes which may exist.
3. Boards must comply with pre-defined addressing.
4. Tri-state buffers should be utilized to prevent bus contention.

## Theory of operation

The schematic for the GPIO card is provided in Fig. 4. The board incorporates U1 and U2, 74LS138, 3 to 8 decoders, to comply with standard IBM PC/XT/AT port allocations, while U3, an 74LS245 octal, tri-state transceiver, buffers the bidirectional data bus. The decoders utilize address lines A2-A9 to locate the general-purpose board at I/O port locations \$300-\$31F. IBM-



PIN	SIGNAL	DESCRIPTION
A2	D7	Bi-directional data bus - description relates to processor initiated bus cycle
A3	D6	
A4	D5	
A5	D4	
A6	D3	WRITE - processor places data on the bus prior to the rising edge of IOW or MEMW which clocks the data into the port or latch
A7	D2	
A8	D1	
A9	D0	
A12	A19	Address lines - 20 lines that provide 1Mbyte of memory addressing. Only lines A0-A15 are used for port addressing
...	...	
A31	A0	
CONTROL SIGNALS		
A1	I/O CH CK	I/O channel check - active low signal used to inform processor of parity error in I/O or memory
A10	I/O CH RDY	I/O channel ready - input to processor used to generate wait states by extending the length of bus cycles for slow memory or I/O
A11	AEN	Address Enable - signal asserted by the direct memory access (DMA) controller to indicate a DMA cycle is in progress. Typically used to disable I/O decoding such that DMA data is not inadvertently used as a port address.
B2	RESET DRV	Reset drive - used to initialize system logic during power up. This signal is synchronized with the falling edge of OSC
B11	MEMR	Memory read / write - active low signals used to control memory read & write operations
B12	MEMW	
B13	IOR	I/O read / write - active low signals used to control I/O port read & write operations
B14	IOW	
B30	OSC	System oscillator which provides a 70 ns (14.31818 Mhz) squarewave
B20	CLOCK	4.77 Mhz or 7.16 Mhz waveform depending upon system type
B28	ALE	Address Latch Enable - low to high transition indicates beginning of a processor initiated bus cycle. System bus does not contain valid address information when ALE is asserted. Valid address information is latch on the high to low transition of ALE.
POWER SUPPLIES		
B1,B10,B31	GND	system ground
B3, B29	+5V	
B5	-5V	
B7	-12V	
B9	+12V	
INTERRUPTS		
B4	IRQ2 (IRQ9)	Interrupt request - An interrupt is generated by asserting the IRQ line and holding it high until the processor acknowledges the request. The request is typically acknowledged in the interrupt service routine (ISR). The ISR may use the OUT command to set a I/O port bit which notifies the device to release the IRQ line. IRQ2 is the highest priority hardware interrupt available on the bus. IRQ2 pin B4, is replaced with IRQ9 in systems which utilized the EISA bus. The system's BIOS typically redirects the IRQ9 vector to that of IRQ2 to maintain compatibility.
B25	IRQ3	
B24	IRQ4	
B23	IRQ5	
B22	IRQ6	
B21	IRQ7	
DMA CONTROL LINES		
B18	DRQ1	DMA Request - synchronous channels used by peripheral to obtain DMA service. DMA request must remain high until the corresponding DACK line goes low. DRQ0 is not available on the bus as it is used to refresh the system's dynamic RAM.
B6	DRQ2	
B16	DRQ3	
B19	DACK0	
B17	DACK1	DMA Acknowledge - active low signals used to acknowledge DMA request (DRQx). DACK0 is used to refresh dynamic RAM.
B26	DACK2	
B15	DACK3	
B27	TRC	
		Terminal Count - provides a pulse when the terminal count for the DMA channel is reached

Table 1. ISA bus pin definitions.

compatible systems reserve these port addresses for prototype cards such as this. A bank of address-select jumpers is provided to allow the user to select from eight distinct 4-byte address blocks within the allocated space. The jumper configuration is shown in Fig. 2.

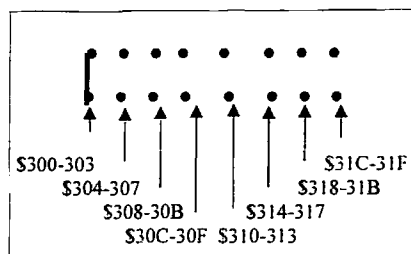


Fig. 2. J3 address block (shown with jumper installed for \$300-303).

The decoder section also utilizes the Input/Output Read (IOR), Input/Output Write (IOW), Address Enable (AEN), and Address Latch Enable (ALE) lines from the system expansion bus. The IOR and IOW signals control the direction of read and

A1	A0	IOW	IOR	FUNCTION
0	0	1	0	read Port A data
0	0	0	1	write to Port A
0	1	1	0	read Port B data
0	1	0	1	write to Port B
1	0	1	0	read Port C data
1	0	0	1	write to Port C
1	1	1	0	undefined
1	1	0	1	write PPI control register

Table 2. 82C55 PPI internal registers.

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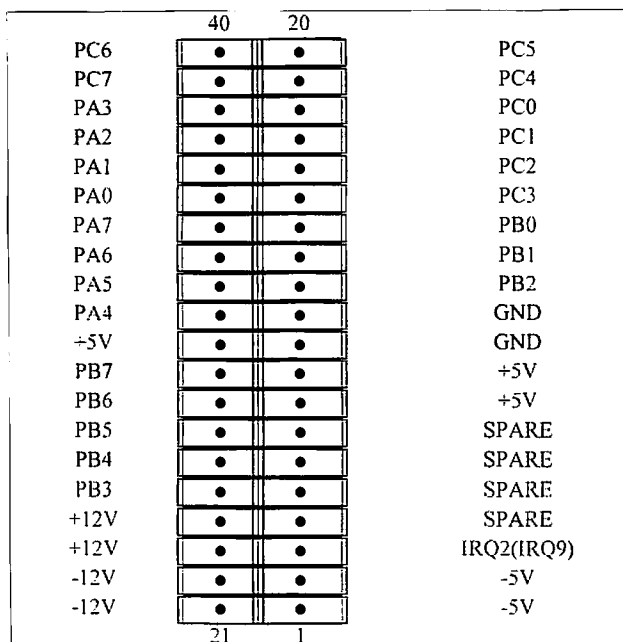


Fig. 3. J2 output connector (rear view).

write operations. These IOR and IOW lines are active low signals which may be asserted by either the processor during port operations or the controller during direct memory access (DMA). The high-level AEN signal seen during DMA cycles inhibits the decoder, thereby preventing accidental interpretation of the data transferred during the process as a valid port address. The processor initiates a bus cycle by asserting and holding ALE until the address bus stabilizes. The ALE signal inhibits the decoder during this period to prevent activation during undefined processor bus states.

A valid port address activates the decoder. The decoder enables the chip-select (CS) on the 82C55 and the U3 data buffer. The general-purpose card also uses address lines A0 and A1 to select one of the four individual registers within the 82C55 programmable peripheral interface (PPI). The IOR/IOW lines and A0 and A1 can now provide access to the 82C55's internal registers as detailed in Table 2. A complete data sheet, including a description of the 82C55 registers, is available at [www.intersil.com/data/fn/fn2/fn2969/fn2969.pdf].

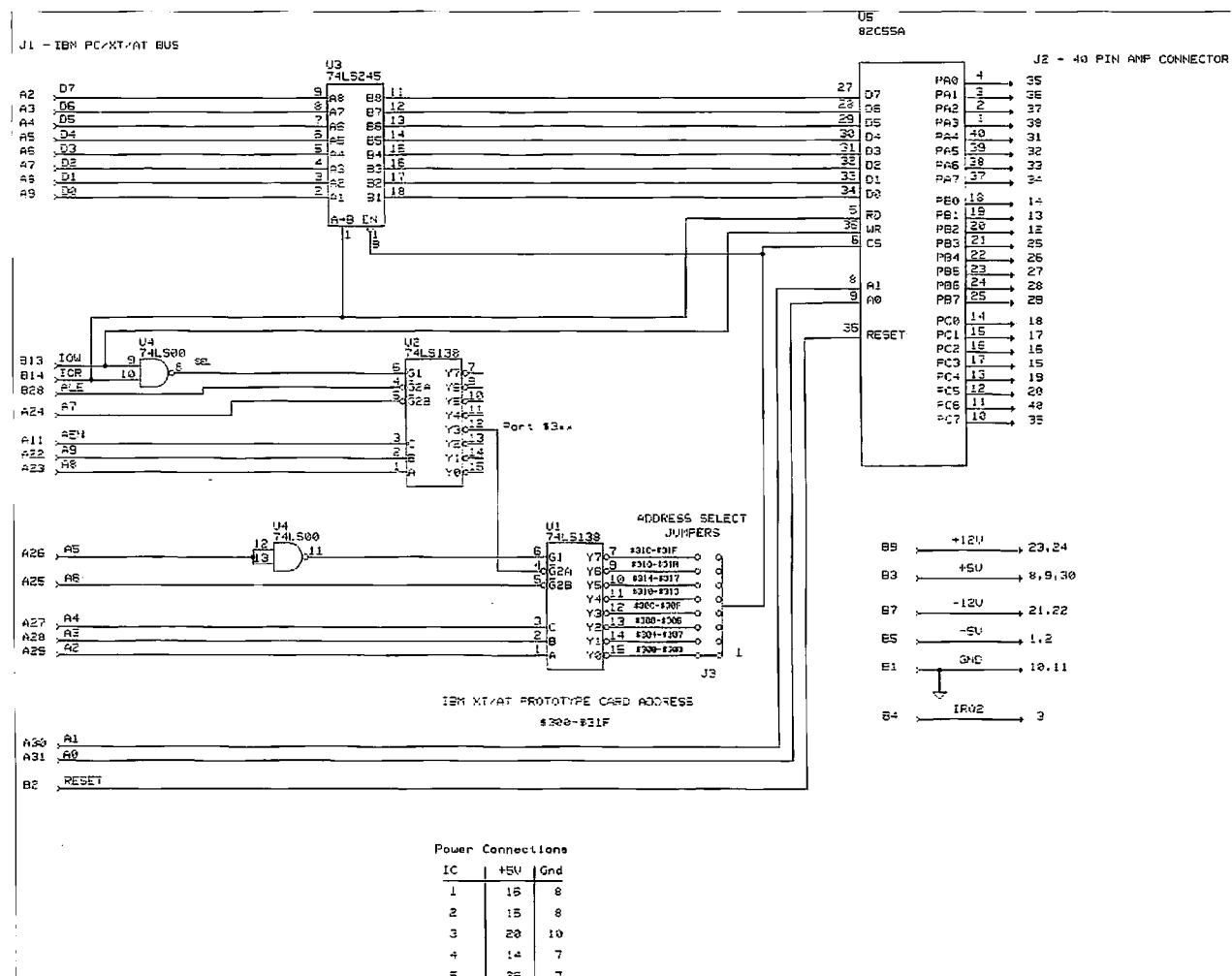


Fig. 4. GPIO schematic.



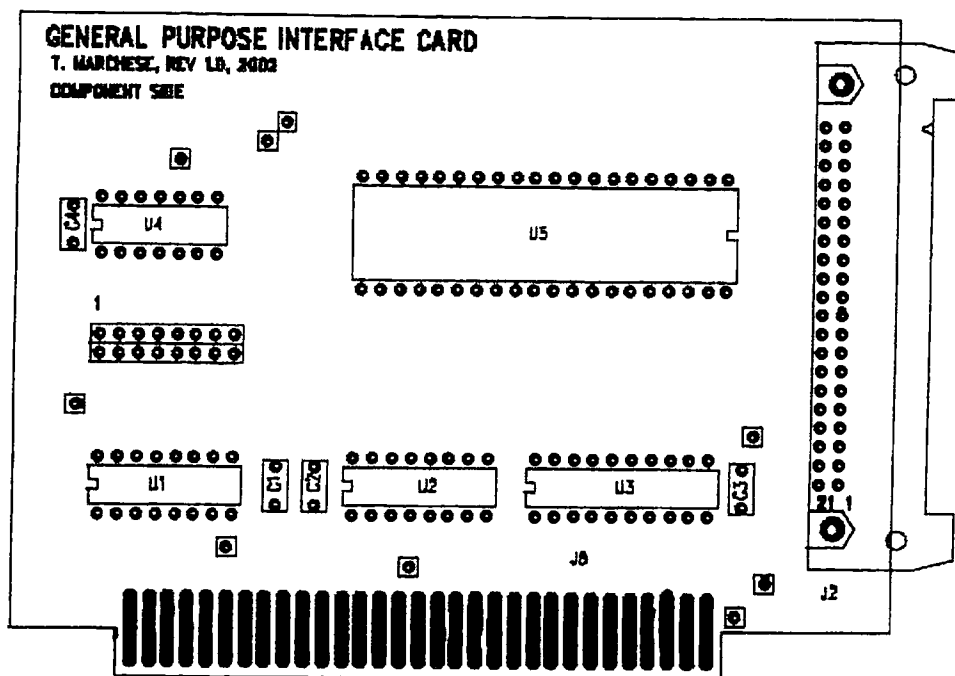


Fig. 5. GPIO PCB layout.

# Construction

The circuit can be constructed on either a prototype card or with the

printed circuit board (PCB) artwork provided in Figs. 5, 6, and 7. The original interface card utilized a prototype board with a combination of

wire-wrap and hard-wired construction. The card functioned well, but occupied the space of two ISA slots because of the long wire-wrap pins. The PCB is

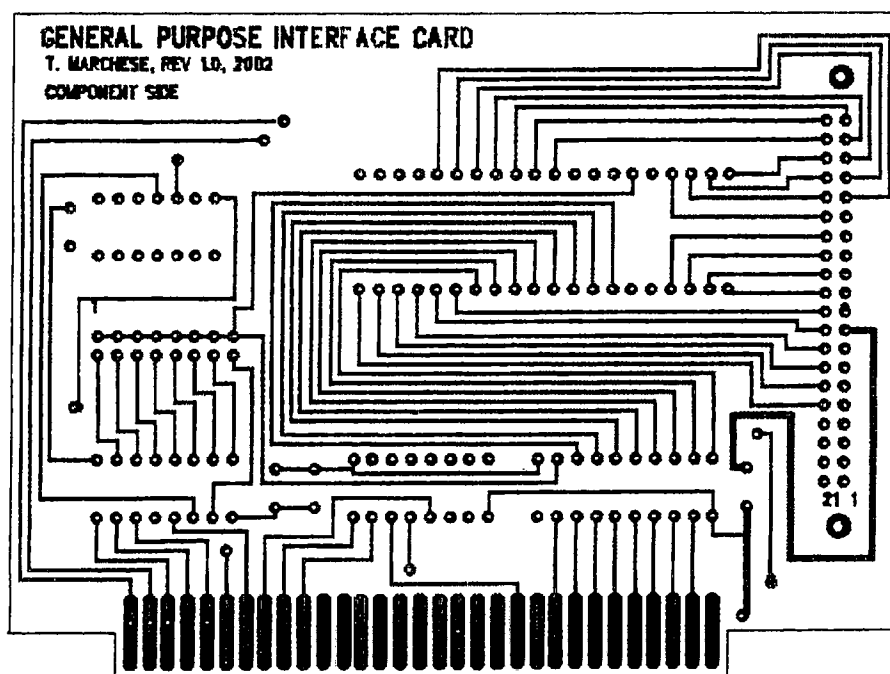


Fig. 6. GPIO PCB component side.



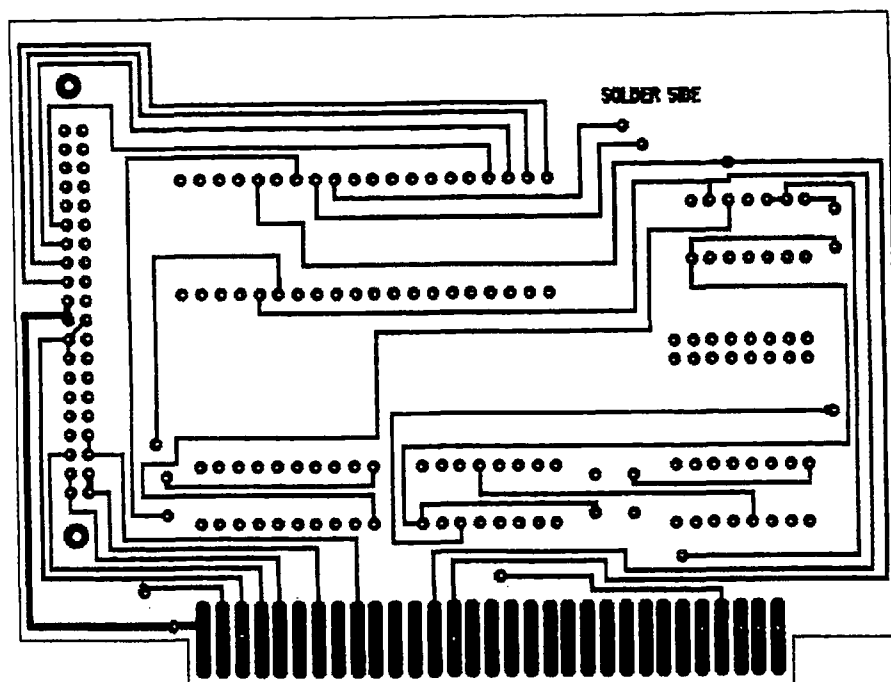


Fig. 7. GPIO PCB solder side.

provided to simplify construction and minimize the space requirements as the card fits in a single, short slot of the ISA bus.

The circuit board includes provisions for J2, a 40-pin connector which matches up nicely with ribbon cable. The J2 connector and cable allows easy access to all of the 82C55's 24 input/output lines. The  $\pm 5V$ ,  $\pm 12V$ , and ground lines from the bus are also made available to the user on J2.

The printed traces are relatively thin. Current drawn from these lines should be limited to less than 20 mA. Extreme caution must be exercised when using these lines as they are tied directly to the computer system's power supply. Remember to protect the computer from damage by adding fuses to the power supply lines when they are used by an external application.

Fuses are purposely not included on

the GPIO board for several reasons. First, the fuse should be appropriate for the application. Incorporating a large fuse to protect the system's power supply will undoubtedly result in damage to your application board if a fault occurs. Second, accessing an external fuse is typically easier than opening the computer and removing the GPIO card. This sounds good on paper, but I'll let you know if I damage my first GPIO card.

IRQ2 is also available on J2, as real-time applications often use a hardware interrupt. Please note that this interrupt is mapped to IRQ9 in EISA bus systems.

A test routine, written in QBasic, is provided here for assessing the card's functionality after construction is complete. The program simultaneously toggles each of the 24 I/O pins. Testing is straightforward: Run the program, then measure any of the PA(x), PB(x), or PC(x) pins with a voltmeter. The output should toggle between less than 0.5V to greater than +4.5V. Save this program, as it will also facilitate testing of the card if problems occur at a later time.

Name	Type	Description	Cost	Jameco P/N
U1	74LS138	3 to 8 decoder/demultiplexer	\$0.29	46607
U2	74LS138	3 to 8 decoder/demultiplexer	\$0.29	46607
U3	74LS245	Octal bus transceiver, tristate	\$0.39	47212
U4	74LS00	Quad 2-input NAND gate	\$0.19	46252
U5	82C55	Programmable peripheral interface	\$4.95	52425
C1-C5	—	0.1 $\mu F$ mylar cap	—	—
J2	—	40-pin header	\$0.55	53604
—	—	Printed circuit board	—	—

Source: Jameco Electronics, 1355 Shoreway Rd., Belmont CA 94002-4100; 800-831-4141; [www.jameco.com]

Table 3. Parts list.



```

.....
* Test program for General Purpose Interface Card
* Program toggles all PPI bits between high & low
* state to facilitate testing. The address jumper, J2
* is assumed to be in the $300-303 position.

```

Description	Hex	Decimal
	Address	Address
* Port A Read / Write	\$300	768
* Port B Read / Write	\$301	769
* Port C Read / Write	\$302	770
* PPI Control Register	\$303	771

```

* Written by Tony Marchese, AB2LX, 2002

```

```

DECLARE SUB timep (x)

```

```

Rcontrol = 771

```

```

* numpulses may be increased if a longer test time is required

```

```

numpulses = 10
high = 255
low = 0

```

```

* set PPI to Mode 0 which configures all interface lines as outputs

```

```

OUT Rcontrol, 128

```

```

* set up to output (qty) of pulses
FOR qty = 1 TO numpulses

```

```

* set all output bits to the high state

```

```

portstate = high
CLS
PRINT "Port Bits = 1 "
PRINT "Pulse Number: "; qty
timep (portstate)

```

```

* clr all output bits to the low state

```

```

portstate = low
CLS
PRINT "Port Bits = 0 "
PRINT "Pulse Number: "; qty
timep (portstate)

```

```

NEXT qty

```

```

END

```

```

SUB timep (portstate)

```

```

PortA = 768
PortB = 769
PortC = 770

```

```

* time delay routine holds output pulse in portstate for time = duration

```

```

FOR duration = 1 TO 20000

```

```

OUT PortA, portstate
OUT PortB, portstate
OUT PortC, portstate

```

```

NEXT duration

```

```

END SUB
.....

```

Test program.

## Conclusions

The GPIO has come in handy for several projects, including as an interface to a stand-alone LCD matrix. The LCD required special timing and control signals which were not readily available from the parallel port. The GPIO provided an easy method to investigate the interface requirements, as the control signals and sequences to the display could be easily manipulated using relatively short QBasic routines. 73

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# Inside a Lampkin

*More secrets of deviant behavior.*

*Test equipment is a ham's best friend! I suppose you'll ask me to justify or explain what I mean by that statement. I may not have a complete answer, but test equipment is like any tool — it has a designed use or an intended application.*

In some cases, the application is very specific and when the equipment is needed, it is **NEEDED NOW!** The rest of the time it will sit idle on the shelf gathering dust. It's during this idle period that the owner becomes complacent and considers parting with the equipment to make room for something "new" and more in vogue with current interests.

During the years of manufacture, Lampkin offered both a deviation meter and a frequency meter as indicated in the 1957 ad shown in **Photo A**. These were both valued instruments that were required to set up FM communication radios for commercial and ham radio applications. **Photos B, C, D, and E** show various views of the FM modulation meter that is better known by hams as a "deev meter."

Being a deviation meter, its application is quite specific, because it was designed to measure only the carrier frequency deviation of an FM transmitter. Since most of us use commercially built ham equipment where the deviation of the carrier frequency is set by the factory, we tend to ignore the fact that we, as hams, are responsible for the signal generated by our transmitter, regardless of who made it. Unlike our cars that get serviced periodically, our ham transmitters never get serviced or checked unless there is a catastrophic failure.

My point is that we're responsible for the emissions from our transmitter, and that includes the amount of frequency deviation produced by the transmitter. When operating through a repeater, the repeater establishes a pseudo deviation requirement of 5 kHz in most cases, and distortion in the audio may occur should we exceed that amount. Listening to our signal at the output of the repeater gives us a fair idea of our transmitter's deviation — distortion vs. no distortion.

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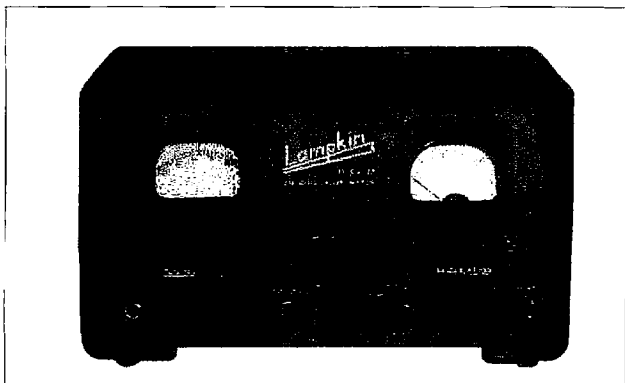
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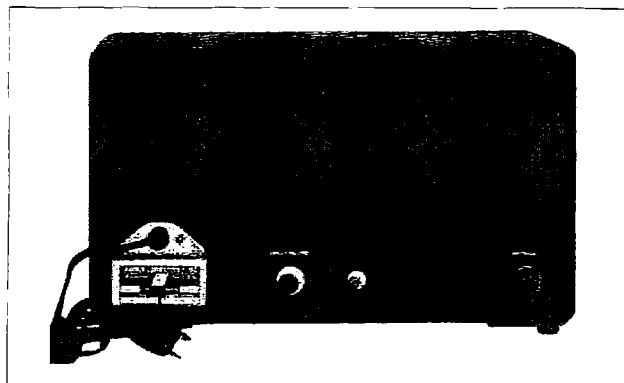
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Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

*Photo A. This is a 1957 ad for Lampkin.*





**Photo B.** Front-panel view of the Lampkin frequency deviation meter.



**Photo C.** Rear view of the deviation meter. Provisions were made for connecting an oscilloscope.

Those of us charged with the responsibility for setting up and maintaining a repeater system must have access to an instrument capable of measuring frequency deviation such as the Lampkin. In addition, most repeaters utilize a subaudible tone (CTCSS) to enable the repeater operation, and this tone has a specified frequency deviation. Although the FCC may not specify the CTCSS tone deviation, the tone must meet several criteria:

1. The waveform must be a sine wave.
2. Deviation must be high enough to reliably activate the repeater's decoder.
3. The deviation level must be low enough to not disrupt the normal voice channel communication.

So how do we, as hams, measure the frequency deviation emitted by our transmitter? The tool designed to perform the measurement is a deviation

meter such as the Lampkin. It gives us the "eyes" to view the deviation of the emitted signal that is displayed on a meter as a deviation value. The Lampkin was designed specifically for measuring emitted signal deviation of an FM transmitter operating in the ham bands from approximately 6 meters to 70 cm. It is also capable of measuring the deviation of the CTCSS tone generator within the transmitter.

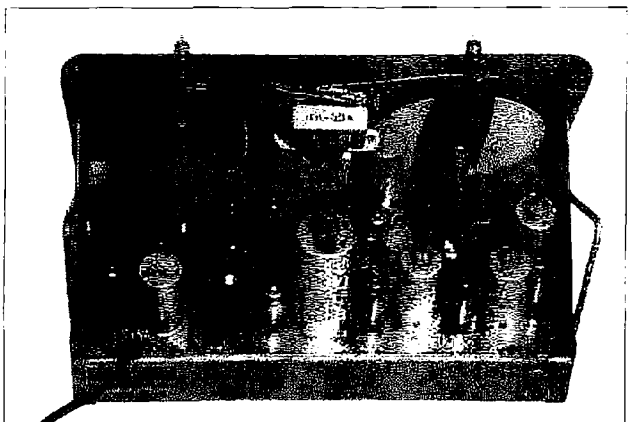
When using the Lampkin, the measurement is very simple and requires only a few moments of time. Because of the short test time it is easy to discount the importance of making the measurement that is needed to ensure that our transmitter meets the FCC requirement. Checking the deviation of our transmitter periodically is like changing the oil in our car, it's good insurance.

#### Deviation theory

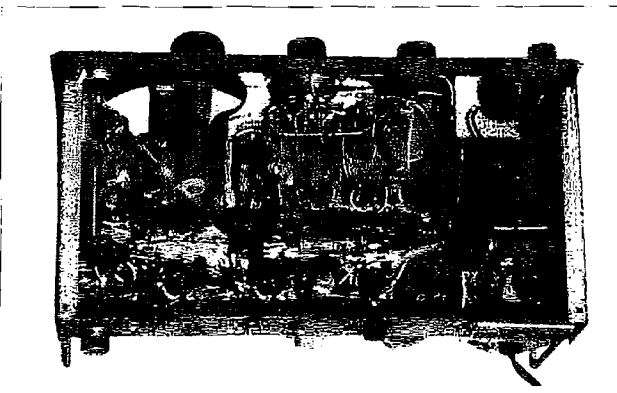
Deviation of an FM signal is an

instantaneous and a direct function of the modulating audio's amplitude measured from the carrier's resting frequency to the plus or minus peak excursion. In essence, that means the loudness of a voice introduced into the microphone controls the peak deviation of the emitted signal. However, to reduce the possibility of creating differing amounts of deviation from random operators, transmitter designs incorporate an audio peak limiter set up to prevent "overmodulation." During normal usage, voice amplitude peaks should not be quite high enough to force the limiter into action. Doing so could create audio distortion.

An important term in FM modulation theory, besides deviation, is the RATE OF DEVIATION. The rate is the speed that the carrier moves while deviating and is a function of the frequency of the audio producing the deviation. When the deviation value and the rate of deviation are combined, a

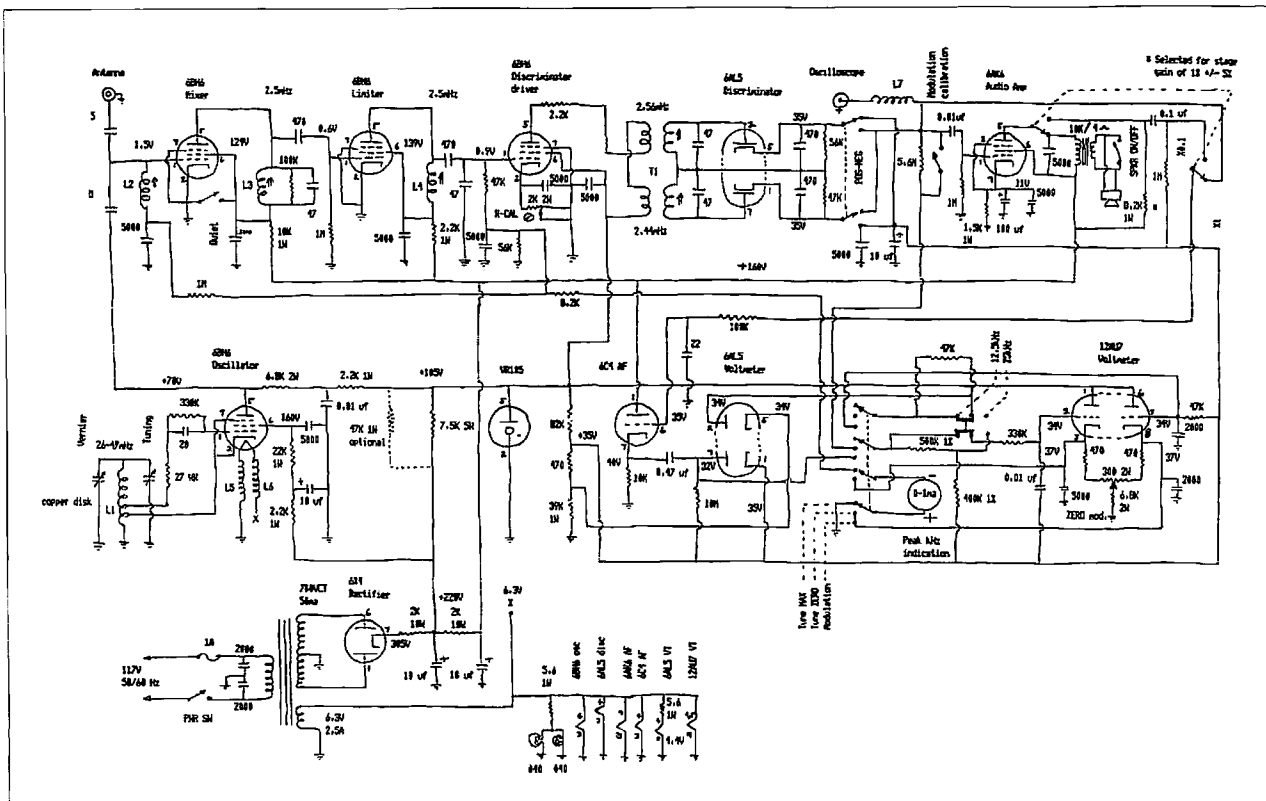


**Photo D.** An inside top view of the chassis and tube layout.



**Photo E.** Inside bottom view of the Lampkin deviation meter. Note the mechanically stable design.





**Fig. 1.** This is a complete schematic for a Lampkin model 205A FM modulation meter.

modulation index value is established. Ham FM transmitters are limited to a modulation index of 1.67, where the index value establishes the maximum bandwidth to be occupied by the emitted signal. Modulation index for a signal is found by dividing the peak signal deviation by the highest audio frequency being transmitted.

### Measuring deviation

There are several methods available to a ham that are suitable for measuring deviation, such as a Lampkin FM

modulation meter, oscilloscopic spectral display, Bessel functions, etc.

Bessel functions are used as the basis for calibrating all deviation measurement equipment because it is accurate and repeatable. The technique utilizes a carrier null that involves the observation of when the FM carrier amplitude passes through a null or zero point. The carrier amplitude will predictably pass through a null at several modulation index points such as  $M = 2.405$  and  $M = 5.52$  as the first two of a series of nulls.

Calibration of deviation involves

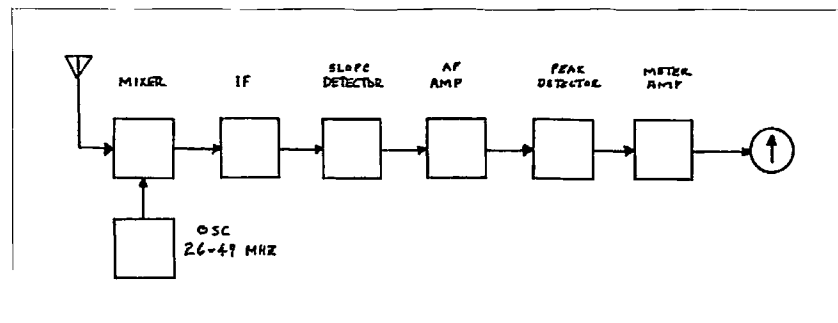
applying a single sine wave audio voltage of known frequency to the voice input of the transmitter and increasing the audio amplitude until the carrier reaches a null. The null is detected as a loss of beat note in a CW or SSB receiver or as a carrier loss as observed on a spectrum analyzer. If the modulating audio frequency were 1 kHz, then at the first null the deviation would be exactly 2.405 kHz, and would be exactly 5.52 kHz at the second null. It is usually easier to detect the first null than the second when listening to a beat note.

For calibration purposes, it is preferable to identify specific or whole number deviation values instead of using a number like 2.405 kHz. Therefore, specific audio frequencies can be calculated for a value of deviation by using the following equations:

$$F_{dev} = AF \times M(\text{at null})$$

or

$$AF = F_{\text{day}}/M(\text{at null})$$



**Fig. 2.** Block diagram of the Lampkin 205A FM modulation meter. The design uses a single conversion superhetro receiver utilizing a dual-slope FM detector.



Audio Frequency Values		
Deviation (in kHz)	1st Null (in Hz)	2nd Null (in Hz)
1	415.8	181.2
2	831.6	362.3
3	1247.4	543.5
4	1663.2	724.6
5	2079.0	905.8
6	2494.8	1086.9
7	2910.6	1268.1

**Table 1.** Audio frequency values required to create a specific deviation using either the first or second null.

Table 1 provides a listing of audio frequencies that will produce specific values of deviation that were derived from the equations. The table indicates values for both the first and second null. Setting up calibration at a single null is generally all that's required, but sometimes the second null provides confidence in the measurement at the first null.

#### Inside a deviation meter

To measure deviation with an instrument such as the Lampkin, the emitted signal must be detected and the peak carrier shift must be determined using a calibrated reference. The Lampkin uses a linear "S" curve produced by a dual-diode slope detector to convert carrier deviation to an instantaneous (peak) AC voltage that is displayed on a calibrated meter. When setting up the deviation meter, the "S" curve must be evaluated or calibrated against a Bessel function measurement.

Fig. 1 shows a complete schematic for the Lampkin FM modulation meter, with a block diagram shown in Fig. 2. It's generally easier to follow an overall device function with a block diagram. The Lampkin utilizes a conventional superhet receiver design that has an untuned input and mixer. Without tuning, the input will accommodate any signal creating a strong mix with the local oscillator, including any of the oscillator's harmonics. In essence, the input of the Lampkin will accept for deviation measurement any signal operating from about 24 MHz up to 500 MHz. The local oscillator is

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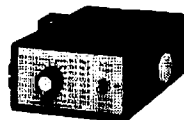
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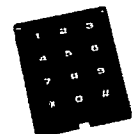
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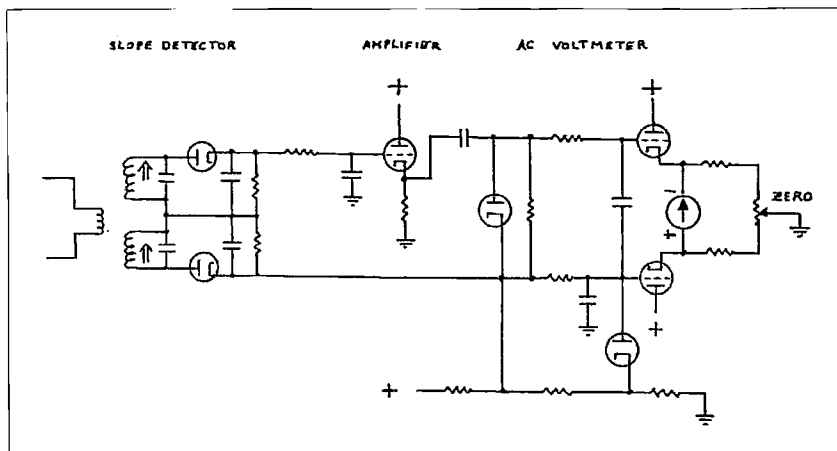


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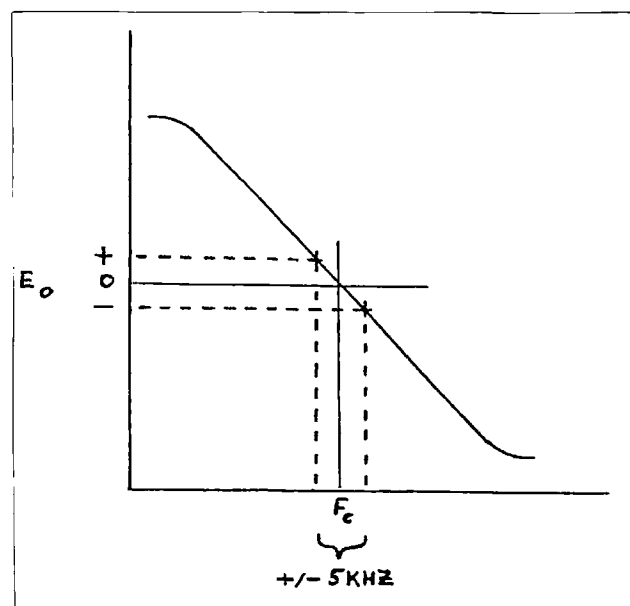
**Fig. 3.** A detailed layout of the dual-slope detector, amplifier, and AC voltmeter used for making a frequency deviation measurement.

designed to operate on a fundamental frequency from about 26 to 49 MHz to provide a signal mix into an IF of 2 MHz.

To ward off inadvertent signal mixes with weaker signals found on the various bands, the receiver's gain factor is intentionally low. A fairly strong signal is required at the Lampkin's antenna, and one of the benefits is noise reduction that improves the reliability of the measurement. If you've ever opened the squelch of an FM receiver you've obviously heard the white noise that emanates from the speaker. White noise is reduced as a function of

signal amplitude and that reduction is important when making a deviation measurement using an FM detector. The objective being to measure the carrier deviation, not display the noise as a factor of deviation.

Referring to **Fig. 3**, the FM detector used in the Lampkin is a dual-diode slope FM detector. In reality, it is two AM detectors offset in frequency such that the combined outputs will produce a linear "S" curve over the desired deviation measurement range. To obtain a linear "S" curve, only a portion of the curve is suitably linear for measurement applications. As shown in



**Fig. 4.** This is the general shape of the "S" curve produced by the dual-slope FM detector. The curved ends are set at  $\pm 60$  kHz. A linear deviation measurement may be made at values below 25 kHz.

**Fig. 1** and the hardware pictured in **Photo B** carry the same model number, the hardware has some slight differences in internal wiring. The schematic matches the ad hardware shown in **Photo A**. The basic model differences are in the measurement scales, where some models are single range while others are multiple range. Otherwise, the operation and capability are essentially the same for all models.

For the age of the instrument, it has a very stable design that was well thought out for the application. As a result, the instrument is well suited for ham radio measurement applications.

### Using the Lampkin

Making frequency deviation measurements with the Lampkin is very easy and requires only a few moments of one's time. The important thing to remember is that ample signal must be coupled into the instrument. Coupling is accomplished by close proximity of the Lampkin's antenna to that of the transmitter. With the instrument's selector switched to TUNE MAX, the signal amplitude coupled into the Lampkin should cause the meter pointer to rise to a value of 5–8 kHz, but not exceeding 12–15 kHz, where saturation could occur.

The steps for setting up the instrument and making the measurement are as follows:

1. Warm up the Lampkin for a minimum of 15 minutes to minimize oscillator drift.
2. Press the "quiet" button and adjust the meter ZERO adjustment to achieve a ZERO reading on the meter.
3. In the TUNE MAX position, couple the input signal to achieve a meter indication of 5–8 kHz while adjusting the main tuning dial — any dial setting that achieves the desired signal level is correct.
4. Select TUNE ZERO and adjust the fine tuning knob for a ZERO meter indication. Verify the zero setting by toggling the POS-NEG switch to average the indication.
5. Select MODULATION and speak into the microphone using a reasonably

**Fig. 4**, the total frequency offset in the two detectors is 120 kHz, and the maximum measurement portion used is 50 kHz ( $\pm 25$  kHz). However, most ham FM systems utilize only the  $\pm 5$  kHz portion of the curve.

Apparently there were several models of the Lampkin deviation meter made, with each having the same model number but slight differences in the circuit. Although the schematic shown in



T U N I N G	Local Oscillator frequency - mHz	x2	x3	x4	x5	Multiplier		x8	x9	x10	x11
						x6	x7				
	26	52	78	104	130	156	182	208	234	260	286
	49	98	147	196	245	294	343	393	441	490	539

Fig. 5. This chart shows the local oscillator's tuning range with the usable frequency coverage via harmonic mixes. The typical measurement range is from 24-500 MHz.

steady voice note. Observe the meter reading for the indicated peak deviation value.

#### 6. Test complete.

To elaborate on step 3 above, some confusion may occur when using the Lampkin for the first time. Due to the low local oscillator frequency, harmonics of the oscillator will create a number of tuning dial settings that indicate the desired tuning level. Fig. 5 shows the basic local oscillator frequency and the tuning range covered by the instrument as a function of the oscillator's harmonic. With an IF of 2 MHz, the indicated tuning range will be  $\pm 2$  MHz of each harmonic frequency indicated. The typical tuning range of the Lampkin is from 24 MHz to 500 MHz. Therefore, when tuning in a transmitter's carrier for step 3 above, it is only necessary to select one of the many possible tuning points on the dial in order to make the deviation measurement.

Setting up and measuring the frequency deviation of a CTCSS tone is fairly difficult with some of the older model Lampkin deviation meters. The later models manufactured accommodated deviation measurements more easily and were capable of displaying a value in the range of 0.5-5 kHz. CTCSS tone deviation is typically within the range of 500-1,000 Hz.

#### Conclusion

Test equipment by default is desirable only when it's needed to make a measurement. With a piece of equipment

such as the Lampkin, it is rarely used unless the operator is involved with frequent equipment maintenance activities. But as a ham, we're responsible for the emissions from our transmitter regardless of who made and/or maintains our equipment. Therefore, it's wise to pay attention and measure the emissions from our gear on a periodic basis. Lampkin FM modulation meters are usually available for a low price, making them a valuable piece of equipment to have included in one's test equipment stable.

The following references are provided for those interested in further study of FM modulation theory and measurement techniques.

#### References

Wells, Hugh. "FM Revisited." 73 *Amateur Radio Today*, p. 21, July 1998.

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# YOU Can Build This VLF to HF Loop Receiving Antenna

Part 3 of 3.

*Linearizing a nonlinear world: We would like the loop's tuned frequency to linearly track the coarse tuning control. If the loop tunes from 2.00 to 7.00 MHz, we would like the same number of degrees of revolution of the tuning knob to cover 2.00–3.00 MHz as it takes to cover 6.00–7.00 MHz.*

If we were using a mechanical variable capacitor, we would use one with plates cut for “straight line frequency.” A varactor equivalent of these ingeniously shaped capacitor plates, unfortunately, isn’t available. So, how do we approximate straight-line frequency tuning with potentiometer and a varactor diode?

The resonant frequency of an LC tuned circuit is given by:

$$f = \frac{1}{2\pi\sqrt{LC}} \quad [4]$$

where:

$f$  is the frequency in Hertz

$L$  is the inductance in henrys

$C$  is the capacitance in farads

In the loop tuner,  $C$  consists of the capacitance of varactor diodes D1–D4, the turn-to-turn distributed capacitance of the loop windings, and strays. (We’ll call both of these last two items together  $C_{\text{stray}}$ ).

Equation 5 provides a good fit for the capacitance versus voltage relationship for the MVAM-109 diodes that I used over the range 0.5 volts through 10 volts:

$$C = 8.5 + 447.6e^{\frac{v-v_0}{k}} \quad [5]$$

where:

$C$  is capacitance in pF

$v_0 = 1.24$

$k = 2.698$

$v$  is the applied voltage, in volts

If we assume that  $L$  is in  $\mu\text{H}$ ,  $C$  is in pF, and  $f$  is in MHz, and then substitute Equation [5] into [4], we get [6], the tuning frequency  $f$  in MHz as a function of tuning voltage  $v$ .

$$f_{\text{MHz}} = \frac{159.16}{\sqrt{L(C_{\text{stray}} + 8.5 + 447.6e^{\frac{v-v_0}{k}})}}$$

At first glance, equation [6] doesn’t look particularly linear. However, it turns out that it isn’t too far away from a straight-line relationship, as can be seen in the error plot.

To see if the linearity could be improved, I modeled the behavior of the circuit using an Excel® spreadsheet and experimented with various values of resistance between the wiper on R11 to +12 V or to ground, based upon the 3-turn air loop of 9.3  $\mu\text{H}$  inductance. An excellent tutorial on using resistors to customize pot responses can be found at R.G. Keen’s Web page “The Secret Life of Pots,” [http://www.

geofex.com/Article\_Folders/potsecrets/potsecret.htm].

A single 3.3k ohm resistor to ground from R11’s wiper reduced the tuning error significantly.

## Parts availability

A few of the parts may prove difficult to find:

- Varactor diodes D1–D4. I used Motorola MVAM-109 diodes, now unfortunately obsolete. The NTE-618 is a substitute and is carried by major parts houses such as Mouser Electronics, 1000 North Main Street Mansfield, TX 76063; 1-800-346-6873; [http://www.mouser.com]; part number 526-NTE618.

- BN 43-202 binocular core and FR-7 1/2-61 ferrite rod. I found these at Ocean State Electronics, 6 Industrial Drive, P.O. Box 1458, Westerly RI 02891; 401-596-3080; (fax) 401-596-3590; [http://www.oselectronics.com].

- Surplus loopstick. Ocean State Electronics lists an inexpensive 3-1/2-inch, 1/2-inch-diameter loopstick, part number LA-540. I purchased several of these some months ago and measured the inductance as 1140  $\mu\text{H}$  with the supplied coil of approximately 105



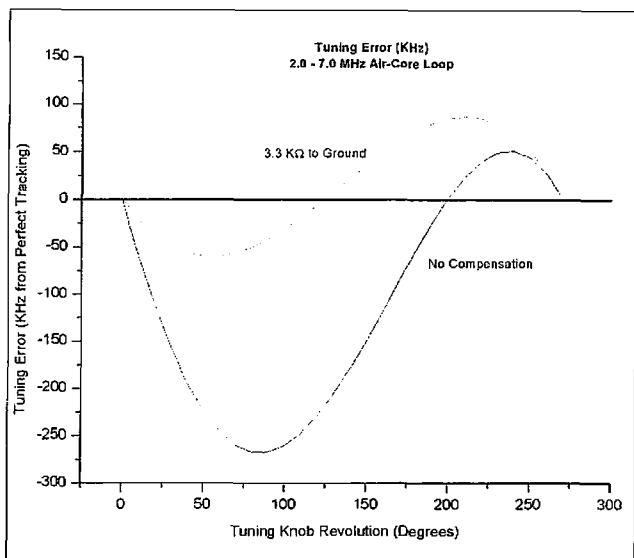


Fig. 10. Tuning error with and without compensation resistor.

turns. The approximate tuning range with the tuner is then 97 kHz to 765 kHz, using low and high modes. It would be possible, of course, to remove sufficient turns to move up resonance. (The LA-540 loopstick is not the one referred to in the text.)

- Q-Dope. Ocean State Electronics carries this product.

- Relay K1 is an Omron model G5V-2-H1 with a 12-volt coil. This relay plugs into a 14-pin DIP socket and has contacts optimized for switching low-level signals. Mouser's part number is 653-G5V-2-H1-DC12. Most major supply houses carry Omron relays.

- Printed circuit board. A printed circuit board is available for this project from Far Circuits, 18N640 Field Court, Dundee IL 60118; voice/fax 847-836-9148; [http://www.cl.ais.net/farcir/].

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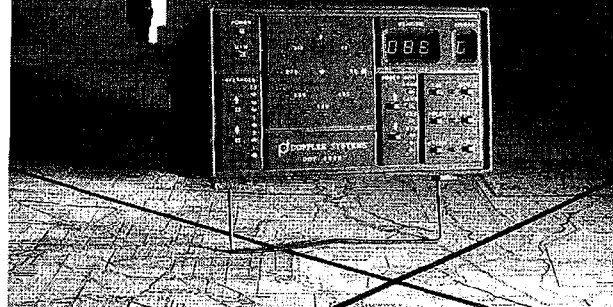
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Hey, we're in luck: There's a QSO in progress ... on 14.145 MHz ...

“Okay, old man, how's my signal over at your QTH?”

“Fine bidness copy, old buddy. Your sig is hittin' my Wisdom antenna just right. We must be in phase with each other.”

“Roger that — my rig is phase-modulated. And with my tri-bang beam, I can walk all over anybody — 10-4?”

\* \* \*

“Say, bud, I need an antenna fer my RV. You got any ideas?”

“Roger-dodger. If I was you, I'd get me a G5 — I unnerstan' they're made fer RVs.”

“What about a Screwdriver?”

“Don't think you'll need it to set up the G5, but I got one if you need it. You want a regular one or a Phillips?”

\* \* \*

“My beam don't seem to be workin'. Ever' time I rotate it, some signals go away, and others come boomin' in.

“I think it's your grammar match. If

I was you, I'd check it fer collusion and oxidation.”

“It might be my co-axel cable, too. I ain't waxed it in a while.”

“Roger that — that's one way to keep them rotten little es-dubya-r off your cable.”

“Oh, double roger that — they just slide right off!”

\* \* \*

“Hey, I tell you 'bout that old guy who jumped on me the other day fer not identifiyin'?”

“Nope. But I'll bet he was a member of the Frequency Fuzz.”

“Well, anyway, this old guy is tellin' me that I gotta identify ever ten minutes, plus during a QSO. So I tells him that I know who I'm talkin' to and the guy I'm talking to knows me, so what's the big deal, I say.”

“Right on, old buddy. Whatta they think, we're stupid or somethin'? I'd identify more often, except the dang call the FCC give me is too hard to remember. In fact, the other day this guy came up and asks me, ‘Hey, fella, you forget your callsign?’ And I got him back real good. ‘Yep,’ says I, ‘I surely did!’”

\* \* \*

“Hey, good buddy, you tell me where I can get me a PL-259-to-AC adapter? I'm fixin' to use my house wirin' for a stealthy antenna.”

“That's a tough one — them things is rare. Fact is, I don't 'member seein' one before. That's probly gonna be a special order.”

“Maybe I'll just try a Lid-Lashup and go wire-to-wire.”

“That'll work. Gimme a call when you test it. I'm lookin' to see how good it works.”

\* \* \*

“Talkin' 'bout antennas — you know much about stranded waves?”

“Well, I knowed a couple gals in the Navy what got accidently locked in the beer cooler over to the Hatch Cover Cafe in San Diego... 'bout 20 years ago. You could consider that stranded, hey?”

“Neg-ah-tory, old buddy. I'm talkin' 'bout waves on my antenna feedcable - you know, them spikey things that run up and down your cable and keep your signal from shootin' out the end of the wire.”



"Roger that — 'course, I think yer referrin' to standin' waves, which are the ratio of up to down. Now I don't know how true it is, but I heard a fella ham talkin' 'bout how you get rid of them things — some new product called 'Wave Bye-Bye.'"

"Roger and QSL on that, good buddy. I'll see if I can't get me a can or tube or box of that stuff. You know where to get it at?"

"Proably special order."

\* \* \*

"How much power you runnin' over there?"

"Don't rightly know. Don't have a power meter, just a voltmeter and a wattmeter."

"Well, just remember that voltage multiplexed by amps gives you the power."

"Yeah, well, I tried that formulation, but all I get is a bunch of dang numbers."

"Roger that. I wish these manafacters would simplify things with a knob that said, 'low, medium, high, and must-go-to-the-'mergency-room-fer-bleedin'-ears.'"

\* \* \*

"Hey, old good buddy, you got yer amp on?"

"Yep — got my lineal up all the way. How's the sigs?"

"Proably 100 over 9. You're so loud that I had to use my accenuator control or you'da blowed my speaker off the desk."

"I notice that you're crashin' in here, too. I turned my gain all the way down and left the room just so's I could copy you."

"Well, thanks for that report. What's yer 20 BTW?"


"Over here in Murky, Texas. How about you?"

"If that don't beat all! I'm in Murky, too — what's yer street there? Over."

"Lemontree Lane. Yers?"

"I'll be hornswaggled! Hey, Bud, do me a favor — step outta yer shack and look north and tell me what my beam looks like from yer place."

"Don't need to. I can see it from the shack window. Looks fine to me — just up there spinnin' in the wind."

"Roger-dodger, ol' buddy. Hey, you suppose that's what they mean when they say 'eyeball QSO'?" 

## NEVER SAY DIE

*continued from page 4*

I loved the challenge of working a hundred countries in one weekend. And the challenge of working all 50 states in one night. Of operating from weird places and providing thousands of contacts for DX hunters. Of making contacts through Oscar all over Europe. Of working my home station on 75m from Australia. Of patching DX stations on 20m into 75m roundtable contacts. Well, you've read all that a dozen times, so shut me up with your ham adventures, with stories of the exciting times you've had. Share.

I write about skiing because I want so much to get you to feel the thrill of zipping down a slope. Our language is totally inadequate when it comes to talking about feelings. There's the thrill of scuba diving around reefs. Of being able to go freely up, down, or any direction. It's like flying.

There must be some reason you're interested in ham radio. So, what is it? Share.

Have you got a piece of equipment that's really fun to use? Tell us about it. Make me unable to keep myself from getting one.

Have you gone on a DXpedition and had a ball? Make me jealous. If you haven't yet, how come? There's nothing like getting on from some place and facing a thousand or so ops, all trying to get through to you at once. Talk about king of the hill! You'll never forget one minute of such an experience for the rest of your life.

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Hillsborough. No, I'm not totally 100% a raw fooder yet. More like 90%. Okay, so maybe I'll only live to be 110 instead of 120.

If you subscribe to *NH ToDo* you'll have a long list of things you'll want to do while you're up this way. But at least give me the pleasure of sharing my wild flower excitement with you for a little while. It's an experience you won't forget.

And while you're here, be sure to include a visit to Franconia Notch, where we have the Old Man of the Mountain, the Cannon Mountain Tramway, The Flume, and the Old Man's Foot Basin. Oh, and Clark's Trading Post, with a bunch of old-time music machines. Plus nearby Lost River Caverns. Your family will have a pack of lifetime memories.

## 9/11 = Big Bucks

Maybe you've read that family members of the WTC victims will be getting an average of \$1,185,000, with a minimum guarantee of \$250,000, and on up to \$4.7 million. And that they're complaining that it isn't enough.

To maybe put that into perspective, family members of American soldiers killed in action get a death benefit of \$6,000, half of which is taxable (which puts the net at about \$4,500), plus \$1,750 for burial costs. Surviving spouses get \$833 a month until they remarry, plus \$211 per month for each child under 18.

Our beloved Congress, which is responsible for this mess, just quietly voted themselves yet another generous raise. These are the people you have been unable to prevent yourself from re-electing every two and six years. These are the people who voted themselves a \$180,000-plus yearly pension benefit, even after only one term in office. A 20-year military retiree gets a \$12,000 a year pension.

There are two lessons here: (1) Never Re-elect Anyone; (2) Joining the military these days is an act of monumental stupidity. It's today's equivalent of slavery—with no freedom, little privacy, and not much pay. And, wow, do the food and living standards suck!

## The Debt

With all their attention focused on the Enron, WorldCom, and other accounting frauds, the biggest fraud, by a wide margin, has been totally ignored by our semi-vigilant, but carefully blindered media.

Of course, if you ask the president or a congressman how much the federal government is in debt the odds are they'll tell you it's \$3.5 trillion. The National Center for Policy Analysis added up the real figures on federal obligations — the stuff that's been swept under the carpet by accounting sleight-of-hand. Like the



\$12.9 trillion that's been "borrowed" by Congress from Social Security. Like \$16.9 trillion for Medicare. The whole works adds up to \$35 trillion, ten times what we're being told. That's \$120,000 for every man, woman, child, and Muslim sleeper. Yes, Congress has cooked the books just the way the brass at Enron and WorldCom did. Will we see heads roll? No. More likely we'll see the government printing presses roll out more money, accelerating our inflation to cover their tracks.

### Vitamin D

D-which? There's the vitamin D our body makes when we expose it to sunlight. This is the vitamin D our bodies have been making for a million years and depend on. This is the vitamin which helps prevent cancer and a bunch of other diseases. Then there's D2, the synthetic vitamin D we get in supplements, which seems to be of little benefit to us. We need to get out in the sun, the way our ancestors did.

No, it isn't healthy to burn your skin. Just build your tan carefully. Sun screen? NO NO NO! Avoid that stuff like the poison it is. Oh, I haven't gotten you to read Russell Blaylock's book, *Excitotoxins*, yet? Sigh.

Gee, but what about skin cancer from too much sun? It's your diet that does that, not the sun. You need those Omega-3 oils.

A lack of the UV-B rays helps promote cancer, depression, SAD, obesity, infertility, PMS, autoimmune disorders, diabetes, arthritis, fatigue, and so on. So get yourself out into the sun every day and do a couple of miles of fast walking. Hyperventilate to get more oxygen into your system. And no wearing any glasses, either.

You can combine your hamming with your exercise, if you want. I set up a repeater so I could use my 2m HT and make contacts through my home station on 20m. I had a ball talking with friends all around the world

while I was doing my daily walks and sopping up D.

### Jungle Rot

A note from a Viet Nam veteran thanked me for making him aware of silver colloid. He said that many of the infantry men from the war have been suffering from a recurrent fungus they have called jungle rot. He's tried every kind of antibiotic ointment on the market, plus a half dozen ointments from the VA. None worked. When he tried a weak solution of silver colloid the burning and itching stopped immediately. He put it on twice a day and the rash completely healed.

Speaking of which, I've got a new silver colloid-making kit available. This is item #82 from Radio Bookshop and it includes a 120V power supply, silver wire and instructions. It's \$37 via priority mail. You need this stuff to help ward off colds, flu, anthrax, fungus, warts, jock itch, and so on.

### Doctors at Work

According to the Journal of the American Medical Association, properly prescribed drugs for properly diagnosed diseases kill over 100,000 patients a year. That's 2,000 per week.

Hmm, hey, guys, what about the death toll from properly prescribed drugs for improperly diagnosed diseases? And deaths from improperly prescribed drugs? Another JAMA report said that half of all prescriptions are either inappropriate or unnecessary.

Then there's busybody Ralph Nader's study which reported 180,000 deaths a year due to hospital negligence.

Plus how many deaths due to diseases caught by hospital patients from other patients?

The next time you bite into a Big Mac or a Whopper, you might mull over these statistics. Oh, did you pass up watching the PBS program on the American meat packing industry? Our national food used to be the hot dog — now it's the burger, made

of 49.5% meat, 49.5% fat, and anyone's guess on the other 1%, which includes growth hormones and antibiotics, plus a generous dusting of manure. They're cooked "well done" to try to kill all the pathogens.

Cows no longer graze on grass, they're stuffed with corn in restrictive feed lots. This makes it so they don't have to take several years to grow, but are ready for McDonald's in a year and a half.

The FDA meat inspections? Har-de-har.

### Subliminal Messages

Do they work? If so, why?

Researchers have found that visual subliminal messages do work. Audio messages don't. And the reason makes good common sense.

With visuals we have two ways of looking at things ... left- and right-brain. We normally read with our left brain, reading one word or phrase at a time at a speed of a few hundred words per minute, while if we learn to read with our right brain we can read a whole page at a time ... in a second or two ... like looking at a picture. Thus, when something is flashed on a screen, even for a fraction of a second, so short a time that it doesn't make it to our conscious mind, it registers with the subconscious...and can thus influence us.

No, none of those audio tapes being promoted to help people stop smoking or lose weight do any good.

### Our Water

Betcha haven't given any thought to where all the prescription and over-the-counter medications go after people take them. Hey, where do you think? The same place products of nicotine breakdown, caffeine, steroids, fecal stuff, insect repellent, detergents, and so on are found ... in our waterways and water table.

Lacing our drinking water with chlorine and fluorides doesn't do anything to get rid of the contaminants. Actually, it just makes the water even

more dangerous to drink. The chlorine is there to get rid of germs, not to remove used medications.

Gee, do you think that this brew most people are drinking could be linked to the dropping sperm count?

### Sperm Counts

Men's sperm counts are dropping. Gee, what a surprise! They've dropped about 50% in the last 50 years and scientists have been trying to figure out what might have caused this.

Is this God's way of limiting the world's population? Gaia seems to be able to self-correct for some problems, perhaps Gaia's doing something. Scientists suspect it's the water.

Our water supply is loaded with PCBs, DDT, estrogen from those birth control pills. One survey found 95 contaminants in waterways across the country. They found the breakdown products of nicotine, caffeine, steroids, insect repellents, antimicrobial soaps, detergents, artificial estrogen, and so on. Yep, and we're drinking that crapola. Well, we are unless we've wised up and are distilling our drinking water.

Check [[www.steamdistiller.com](http://www.steamdistiller.com)] for a \$119 still.

Of course that won't keep you from getting loaded with growth hormones and antibiotics when you eat that Big Mac. And there's good reason to suspect that these, too, will be affecting sperm. Same deal with the mass-produced chickens. And eggs. I see where eggs from free-ranging chickens, fed vegetables instead of commercial chicken feed, are going for \$4 and \$5 a dozen. Hmm, but how many of those veggies are organic, having not been grown in mineral-depleted soil using chemical fertilizer and then sprayed with pesticides to ward off the ensuing bugs?

We've sure made a mess of things by leaving our food supply up to a few giant corporations who have our money in mind, not our health. And then trusting our government



to protect us from these corrupt corporations, who have both our politicians and the federal agencies in their pockets.

It's almost time to start planting your own garden and purifying your water.

## Sleeping

Judging from the huge audience listening to the Art Bell show every night, there sure are an awful lot of people who have insomnia. I've probably written about this before, but it's been long enough to do it again. It's Uncle Wayne's way to fall asleep almost instantly. If you haven't any problem with this, and don't know anyone who has, skip on to the next subject.

Okay, here's the easy route to the Nod Land.

The secret is to condition yourself, mind and body. We are creatures of habit, so let's recognize it and start using habits to make life easier for us. Every time, from now on, when you go to bed, get into the same comfortable position. Pretty soon, every time you get into that position, you'll be on an express train to Nod.

Make sure your bedroom is as totally dark as you can make it. Our bodies are hard-wired to sleep best when we keep them in total darkness.

Now, consciously relax your body, one piece at a time. Feel how heavy your arms are. Your legs.

Next, you need to still that racing brain which may be buzzing about something. Think the word "zzzzooo." Over and over ... "zzzzoooo."

When I am going to sleep I set the alarm in my brain for when I want to wake up. If it's an afternoon nap, I set it for an hour. Bingo, I wake up within a minute or two exactly an hour later. Your mind will do whatever you tell it to. At night I set my mental alarm for six hours. No matter what time I go to bed, no matter how worrisome the day, I'm asleep in seconds and my mind awakens me six hours later. And this is something anyone can do.

End of today's lesson. Please remember to pay your dues by teaching this technique to any friends who can use the help. And tell 'em about 73.

## Those Pesky Crop Patterns

No, despite some silly debunking, the crop circles, as they're being called, are not being laid down by two old British farmers with nothing better to do. There are reliable reports from as early as 1678 of such strange patterns suddenly appearing in crop fields. Over 9,000 of these often-huge patterns have been recently reported in almost 50 countries, and they've been laid down in just about any kind of crop, including Japanese rice paddies and even snow and ice areas.

The best book I've found on them is *Crop Circles* by Judith Moore and Barbara Lamb. The color photos are superb and worth the \$25 price for the 266-page 8-1/2" x 10" book. ISBN 1-891824-32-5. See [www.lighttechnology.com]. Barnes and Noble got me a copy.

No, we still haven't a clue as to what intelligence is creating them. We don't know how or why they're being made, nor can we duplicate the process with any known technology.

It's interesting that crop circle groups have been able to get together and meditate on a pattern, which then turns up the next morning in a nearby field.

Why are they happening? The book speculates at length, but the bottom line is that we just don't know. The book was published in 2001, so it doesn't include the recent replication of the message sent out from the Arecibo dish 30 years ago, with the alteration of the human body depiction changed to a large-headed alien.

This, like UFO sightings, contactee reports, and cattle mutilations, is something for which scientists have no explanation, and thus they're trying to ignore it. Swamp gas. Come on you guys, admit you're totally stumped. Open

your ivory tower gate, lower the drawbridge, and at least admit there's a world outside which needs exploration. This is a world into which J.B. Rhine, the Princeton Labs, Dean Radin, and John Mack have ventured with their pioneering work.

## Hanky Panky

I wouldn't try to rattle your thoroughly inculcated belief in doctors and the FDA's role in protecting us except for the article in the June 24th *Business Week* on drug research credibility. Or, more accurately, incredibility. Yep, *BW* took a big bite out of the medical advertising hand that feeds 'em.

The drug companies that invent and patent new drugs have to get them okayed by the FDA before they can foist them on the public. And this means they have to get scientists to do research projects. The scientists know that if they come up with negative findings they aren't likely to get any more work from the drug company. And the drug company has no incentive to submit negative project reports to the FDA. They bury them. The FDA does no research, they just depend on the drug companies for this.

The bottom line for all this is right where you know it is. The FDA is in the business of

protecting the revenues of the drug industry, not the welfare of the public. As with most things having to do with the government, the public has almost no way to influence what's going on. That's left to lobbyists and their generous drug company benefactors.

## Organ Transplants

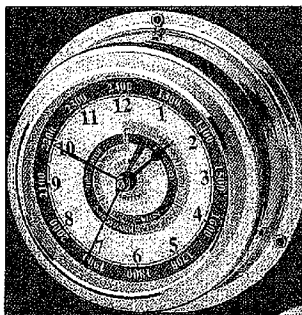
The only reason anyone needs an organ transplant is because they've ruined the one they started out with. And, unless they make some major changes in their lifestyle, they'll immediately get busy destroying the replacement part. And ditto goes for bypass operations. How are people destroying their body parts? With poisons, stress, lousy nutrition, lack of exercise, lack of sunlight, and dehydration, that's how.

## Say When

The government has inched up over the last century from taking 2% of our earnings to a current 47%. It's the old frog-in-the-kettle bit, only we are the frogs.

The result has been that it now takes two people to earn the same relative pay as one used to when I was a kid. One is working for the family, the other just to pay

*Continued on page 62*



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David Larsen KK4WW  
Gaynell Larsen KK4WWW  
Don Clemens KE4UGF  
Kay Clemens KF4EKH  
Foundation for Amateur International  
Radio Service (FAIRS)  
P.O. Box 341  
Floyd VA 24091

# FAIRS in Dominica

*As the saying goes, it was a tough job, but somebody had to do it.*

*Picture this: A beautiful tropical island, rugged mountains with cascading waterfalls, and a profusion of colorful, exotic plants spilling over garden walls and lining the roadsides. The Caribbean Sea can be viewed from any high point on the west side and the Atlantic Ocean, from the east side. Both are a deep azure blue, with a ruffle of white waves along the beaches.*

**N**ow, picture this: You are on this island at the site of the new radio clubhouse in Roseau, the capital of Dominica. It is also up on the side of a mountain

overlooking the Caribbean. It has two bedrooms, a bath, kitchen, radio room, conference and meeting rooms. The club has rented this room to you for your vacation and you can make

contacts all over the world using either your equipment or theirs.

Sound like a dream? Well, at the moment it is, but not for long. The ground-breaking for the clubhouse was held on Tuesday, February 5, 2002. It will be located on the side of a mountain overlooking the Caribbean.

The Dominican Amateur Radio Club (DARC) is very active and involved in many community activities. There were about 35 members at the ground-breaking, along

with government officials and four members of FAIRS (Foundation for Amateur International Radio Service) from the United States.

The main speaker was the Honorable Reginald Austrie, Minister of Communication and Works. Other officials present were Paul A. Brown, Organization of American States; Daniel T.C. Liao, Chargé d'Affaires, Embassy of the People's Republic of China; and David Larsen, director of the Foundation for Amateur International Radio Service (FAIRS).

During the FAIRS visit in 2001, Clement Pierre Louis J73CPL, Raymond J73RJ, and David and Gaynell Larsen had met with Minister Austrie. He had promised to help secure a plot of land for a permanent location. Minister Austrie has kept his promise, with a land grant of about 1/4 of an acre in an excellent location. About one mile from the ocean — good access — power — water — one mile from Canfield airport, and very close to the capital, Roseau. The club has a 99-year lease on this land, valued at about \$45,000, for a very modest annual payment.

The FAIRS goal is to "build global friendship" between people and nations



**Photo A.** Dave Larsen KK4WW, director of the Foundation for Amateur International Radio Service (FAIRS), speaking at the DARC ground-breaking and announcing a \$5,500 donation on behalf of all FAIRS members for the building project. In the center is the Honorable Reginald Austrie, Minister of Communication and Works for Dominica, and on the right is Clem James J73CI, president of the Dominica Amateur Radio Club. Thanks to the diligent work of Minister Austrie and J73CPL, the DARC is able to lease a land grant of about 1/4 of an acre of land (valued at about \$45,000) for the clubhouse.





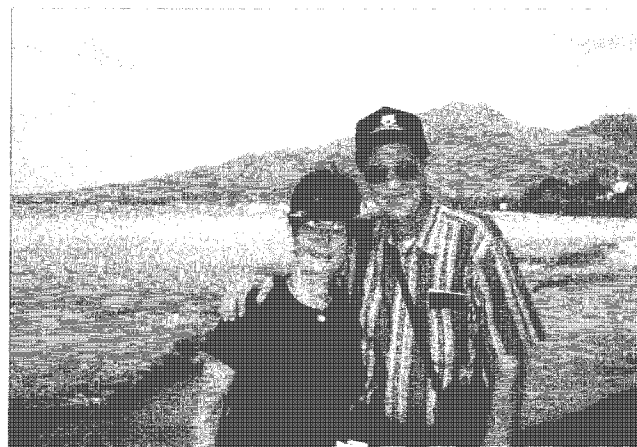
**Photo B.** Some of the Dominica Amateur Radio Club members at a FAIRS gathering in Roseau, Dominica.



**Photo C.** Don and Kay Clemens, FAIRS members operating as J79UGF and J79EKH, at the QTH of Clement and Hetty Pierre Louis. This location in the mountains gives it at least a 20 dB advantage over the stations off the mountain. All who send QSL confirmation cards to N4USA (FAIRS club station) will receive one of our J79 cards in reply. Thank-you, Don, for looking through the logs and confirming all the cards for us.



**Photo D.** Hetty and Clement Pierre Louis (J73HPL, J73CPL) outside their home in Wotten Waven. Clement is Deputy Commissioner of Police for Dominica and also vice president of the DARC. Hetty is also very active in the DARC and has her own beauty shop in Canefield. The FAIRS visitors stayed with Hetty and Clement and really enjoyed operating their ham station and feasting on Hetty's Caribbean meals.



**Photo E.** Dave and Gaynell Larsen (KK4WW, KK4WWW), FAIRS directors, near the Caribbean on the west side of Dominica. The whole island is very rugged with mountains and is about 15 by 30 miles in size. A real nature island with beautiful rain forest, rivers, friendly people, and an abundance of tropical fruit and wild life. The Dominicans say that if Christopher Columbus were to return he would find the island just as he did when he discovered it.

by using amateur radio. At the ground-breaking, David Larsen announced a \$2,000 donation, plus an additional \$3,500 from individual donors, for a total of \$5,500 to assist in building the new clubhouse.

David KK4WW and Gaynell KK4WWW Larsen and Don KE4UGF and Kay KF4EKH Clemens, all of Floyd, VA, have been actively involved in raising funds through FAIRS for several years. This was the sixth visit for FAIRS members to Dominica, during which they have brought radio equipment, generator, handie-talkies, HF radios, antenna, solar panels, repeater battery bank, coax, and lots of tools. They are well-known at the airport.

Now, Dominica has Internet Repeater Link Project (IRLP) capabilities, and they are also up-to-date with two-meter and 440 repeaters across the island and with connections to surrounding islands. Members of the club are very friendly (English-speaking) operators who depend constantly on their handie-talkies for staying in touch with each

Continued on page 59

<b>J7</b>		<b>J79WW</b> David Larsen	<b>J79UGF</b> Don Clemens
<b>COMMONWEALTH</b>		<b>J79WWW</b> Gaynell Larsen	<b>J79EKH</b> Kay Clemens
<b>Dominica</b>			
Caribbean			
<b>FAIRS</b>			
P.O. Box 341			
Floyd VA 24061 USA			
Grid Sq. FK95		J07	
<p>NAME _____</p> <p>ADDRESS _____</p> <p>CITY _____ STATE _____ ZIP _____</p> <p>PHONE _____</p> <p>PLEASE USE TEL. _____</p>			

**Fig. 1.** QSL card.



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the December issue, we should receive it by September 30. Provide a clear, concise summary of the essential details about your Calendar Event.*

## AUG 31

**UNIONTOWN, PA** The Uniontown ARC will hold its 53rd annual Gabfest at the club grounds located on Old Pittsburgh Rd., just north of the Intersection of Routes PA-51 and US-119. Start is 8 a.m. Free parking. Free tailgate space with registration. Talk-in on 147.045(+). Table space available. For info contact *Carl WA3HQK*, or *Joyce KA3CUT* at 304-594-3779.

## SEP 7

**BALLSTON SPA, NY** The Saratoga County R.A.C.E.S. Assn. Inc. will hold its 17th Annual Hamfest Saturday, September 7th, at the Saratoga County Fairgrounds in Ballston Spa. This will be held all under cover, rain or shine. Gates open at 7 a.m., with the hamfest running until 3 p.m. Admission is \$5 (includes 1 tailgate spot and free parking). There will be door prizes, a fox hunt, VE exams, and plenty of food. Talk-in on 146.40/147.00 and 147.84/.24. Reserved tables \$5 each, first come, first served. Reservations and pre-pay are encouraged. Early setup for all vendors. For further info or reservations contact *Darlene Lake N2XQG*, 314 Loudon Rd. #84, Saratoga Springs NY 12866; phone 518-587-2385. E-mail [lake@capital.net].

## SEP 8

**SOUTH DARTMOUTH, MA** The Southeastern Massachusetts ARA, Inc. will hold its annual flea market on the club's grounds at 54 Donald St., South Dartmouth MA. The event will run from 9 a.m. to 1 p.m. Talk-in on 147.00/.60. Admission \$2 (spouse and children free). Food, door prizes, and more. Free space for vendors! For further info contact *Tim Smith N1TI* at 508-758-3680, or by E-mail at [rt\_smith@yahoo.com].

## SEP 14

**GRAND RAPIDS, MI** The Grand Rapids ARA, Lowell ARC, and Michigan ARA will co-sponsor a Hamfest at Forest Hills Northern High School, 3801 Leonard St. NE. Hwy. I-96 to exit #38 / Hwy. M-44, north 1 mile to Leonard St., turn right (east). The event starts at 8 a.m. and will run until after 12 noon. Seller setup at 6 a.m. Talk-in on 147.26(+) (94.8 Hz) and 146.52 simplex. Admission of \$5 is not required of high school or younger students with a student ID.

8 ft. tables paid in advance are \$8 each, non-reserved 5 ft. cafeteria style tables \$5 each. Outside trunk sales spaces no additional charge with admission ticket. Friday night overnight parking permitted, no hook ups. VE exams (ARRL VEC) will be held at 11 a.m., all walk-ins. Contact *Ed Novakowski N8UXN* [hamfest@w8dc.org] or 616-458-9029 evenings. Check the Web at [http://www.w8dc.org/swap.htm].

**SYRACUSE, NY** The Radio Amateurs of Greater Syracuse presents its 47th Hamfest from 8 a.m. to 2 p.m. at the Pompey Hills Fire Dept., Saturday Sept. 14th. Take I-81 exit #15 on to Route 20 East. Go 6 miles to Henneberry Rd. on the left. VE walk-in exams at noon. Admission \$5 or 16 years and under free. Large outdoor flea market. Indoor flea market \$10 with 8 ft. table, or bring-your-own table for only \$5. Breakfast (starting at 7 a.m.) and lunch served. The site is located at 1400 feet above average terrain, so bring your mobile rig and work some DX. Talk-in on 147.90/.30 MHz. Phone 315-698-4558. Mail to *RAGS Hamfest*, Box 88, Liverpool NY 13088. E-mail to [ragsonline@hotmail.com], or visit the Web site at [www.pagessz.net/~rags] for more info.

## SEP 21

**NEW PORT RICHEY, FL** The Suncoast Amateur Radio Club will host the 12th Pasco County Hamfest at New Port Richey Rec. Center, 6630 Van Buren Rd., New Port Richey FL, 9 a.m. to 4 p.m. Talk-in on 145.35(-) rptr. Admission \$5, XYs and under 12 admitted free. 8 ft. inside tables \$15 each; electric \$5. Tailgate spaces \$3 each. You must have admission to enter tailgate or exhibit hall. For info contact *Tim WD8MVU*, 727-848-0353. E-mail [TRobin@homemail.com].

**ROLLING MEADOWS, IL** The Northern Illinois DX Assn. will sponsor the 50th Annual W9DXCC Midwest DX Convention and Banquet, Saturday, September 21st, at the Holiday Inn in Rolling Meadows IL. Details and registration form are at [www.w9dxc.com]. Friday, September 20th, there will be a Welcome Reception hosted by Carl Smith N4AA and DX Publications. Late Friday, a Hospitality Suite will be hosted by the Northern Illinois DX Assn. Stay late Saturday night for the Hospitality Suite being hosted by the Greater Milwaukee DX Assn. An ARRL Forum

and presentations by major DXpeditions will be happening on Saturday at the main event.

## SEP 22

**NEWTOWN, CT** The Western CT Hamfest will be held 9 a.m. to 1 p.m. at Edmond Town Hall, Rt. 6. Exit 10 off I-84. Follow signs. Setup at 7 a.m. Talk-in on 146.67/.17. New equipment dealers, flea market, tailgating, electronics, computers, refreshments. Tables \$10, tailgating \$6 (each includes one admission). Admission \$4, under 12-years-old free. For reservations and info, contact *John M. Ahle W1JMA*, 120 Fire Hill Rd., Ridgefield CT 06877. Phone 203-438-6782; E-mail [W1JMA@aol.com]. This event is being sponsored by the Western CT Hamfest. Thanks to the Candlewood ARA of Danbury CT for this announcement.

**SHARONVILLE, OH** The Greater Cincinnati ARA annual Cincinnati Hamfest is Sunday, Sept. 22nd, at Scarlet Oaks Vocational School Campus in the Cincinnati suburb of Sharonville OH. Doors open to the public at 8 a.m. Admission \$5 in advance, send an SASE; \$6 at the gate. Age 12 and under free. Forums include Operational PSK, Old Tyme Ham Radio, ARRL, and more. Outdoor flea market, indoor vendors, food, free parking, radio controlled model car races, hidden transmitter hunts. Talk-in on 146.88 rptr. See [CincinnatiAmateurRadio.com], click on Hamfest link for full details and directions, or contact *Jim Weaver KBJE*, General Chairman, 513-459-1661 or [k8je@arrl.net].

## SEP 28

**HORSEHEADS, NY** The 27th Annual Elmira International Hamfest/Computerfest, sponsored by the Amateur Radio Association of the Southern Tier, Inc. and the Chemung County Amateur Radio Emergency Service, will be held at Chemung County Fairgrounds 6 a.m. to 3 p.m. Talk-in on ARAST rptr. 146.70(-) and 444.20. Pancake breakfast starting at 6 a.m. Free flea market, ham and electronic gear preferred. VE exams on the grounds 0900, walk-ins accepted. Dealer displays. Gates will be closed from 12:00 midnight Friday night until 5 a.m. Saturday morning. Plenty of free parking. Bunny hunt. No charge to RVs and trailers coming in Saturday a.m. and going out Saturday p.m. \$15 charge for persons staying



on the grounds from 12 midnight to 6 a.m. Advance tickets \$5, \$6 at the gate. 10 and under admitted free. Make checks payable to *Amateur Radio Association of the Southern Tier, Inc. "ARAST, INC."* Add 55 cents for postage and handling. *Elmira Hamfest, P.O. Box 44, Elmira NY 14902-0044*. Phone 607-738-6857. For more info, E-mail one of the auto-responders: [info@arast.org], [hamfest@arast.org], or [winterfest@arast.org]. Advance tickets are also available at *Corning Electronics, Inc., 35 Riverside Dr., Corning NY 14830*; or *Tropical Fish Outlet, 2065 Lake Rd., Elmira NY 14901*.

**LAWRENCEVILLE, NJ** The Delaware Valley Radio Assn. W2ZQ Hamfest, will be held rain or shine, September 28th, at the NJ National Guard Armory, Eggerts Crossing Rd., Lawrenceville NJ. Talk-in on 146.67(-) 131.8. Vendor setup at 0600-0800; general admission 0800-1400. Admission \$6 per person, under 12-years-old free. Tailgate vendor \$10, includes one admission. Indoor vendor \$15, includes one admission. Indoor vendor wall space with electricity \$20, includes one admission. Extra tables \$10 each. For more info contact *Glenn Costello N2RPM, [abbott0903@aol.com]*, phone 609-882-2240. Visit the Web site at [http://www.w2zq.com].

#### OCT 5

**WARSAW, MO** The Twin Lakes ARC will sponsor the Warsaw MO Hamfest Saturday, October 5th from 9 a.m. to 4 p.m., at the Warsaw Community Bldg., one block west of the square. Talk-in on 147.300 on the Warsaw rpt. Setup is at 5:30 a.m. Admission \$2 at the gate. 8 ft. tables \$10 each (hurry, only 30 available). Breakfast and lunch will be served on site. For more info call *Gene* at 660-438-8650, or E-mail to [gpo@advertisenet.com].

#### OCT 6

**MEDINA, OH** The Medina Two Meter Group will present the Medina Hamfest at the Medina County Career Center, 1101 W. Liberty St. (State Route 18) Medina OH 44256. This location is just 3 miles west on Route 18 from downtown Medina. Talk-in on 147.030(+). All indoor tables and spaces. Computer equipment, new and used ham gear, ARRL approved. Advance vendors tables \$9 each (includes one admission ticket per table). Inside flea market space (includes one admission ticket per space) \$7 each in advance. One flea market space is enough room for one 8 ft. table. Two spaces would equal 16 feet. Advance reservations must be received by 09/29/02. An SASE is required for return of tickets. All tables will be held until 9 a.m. the day of the show. Let us know if you have any personal requests. Please send your remittance to the *Medina Hamfest Committee, P.O. Box 452, Medina OH 44258*. Visit [www.qsl.net/m2m] for more information. For

general questions about the hamfest contact *Mike N8TZY* at 330-273-1519 after 7 p.m., or E-mail [n8tzy@m3net.net]. For VE exam info call *Fred K8FH* at 440-236-3477. Walk-ins are always welcome. Testing starts at 9 a.m.

#### OCT 12

**BREMERTON, WA** On Oct. 12th, 9 a.m. to 3 p.m., the North Kitsap ARC will host a Hamfest at President's Hall, Kitsap County Fair Grounds, NW corner of Fairgrounds Rd. at Nels Nelson Rd. Talk-in on 146.62(-) PL 103.5 WWRA rpt., or 146.53 simplex. Admission \$5, 12 and under admitted free. New and used equipment. Tables \$15 each (and one free admission) until 09/30/02; \$20 each afterwards. Helpers for renters of personal tables (2 max) \$4 each. Commercial spaces \$30. Electrical power \$2 per table. Contact *Russ Swank K17PG, P.O. Box 2268, Silverdale WA 98383-2268*. Phone 360-697-6451, or E-mail to [nkarc@yahoo.com]. Info available at [www.silverlink.net/nkarc].

**WASHINGTON TOWNSHIP, NJ** The Bergen ARA will sponsor its Annual Fall Hamfest on Saturday October 12th, at the Westwood Regional Jr./Sr. High School, 701 Ridgewood Rd., Washington Township NJ. This is approximately 15 minutes from the GW Bridge and 5 minutes from Paramus NJ. Vendors arrive at 6 a.m. General admission 8 a.m. to 2 p.m. VE exams 8 a.m. to 10 a.m. only. DXCC card checking. Rain or shine. Indoor and outdoor spaces. Lots of parking for tailgating. Admission is \$5 donation (non-ham family members free), and vendors \$10 per space. Rest room facilities and refreshments available. For more information check the BARA Web site at [www.bara.org], or contact *Jim Joyce K2ZO* at [K2ZO@arrl.net] or 201-664-6725. Talk-in on 146.19/79.

#### OCT 13

**WALLINGFORD, CT** The Meriden ARC, Inc., will present the 10th Annual Nutmeg Hamfest & Computer Show, featuring the 2002 American Radio Relay League State Convention, Sunday October 13th, 9 a.m. to 3 p.m., rain or shine, at the Mountainside Special Event Facility, High Hill Rd., Wallingford CT. Exit 15 Rte. 91 (North or South), follow signs. Vendor setup starts at 6 a.m. Inside selling space \$30 (booth space with 8 ft. table, and chair). If you reserve and pay in full before Sept. 13th, deduct \$5. Outside spaces \$20, one tailgate 30 ft. space. General admission is \$7. Children under 12 admitted free, but must be accompanied by an adult at all times. Make checks payable to *Nutmeg Hamfest*; send payment to *Andy Purchia N1XXU, 116 Kensington Ave., Meriden CT 06451*. Phone 203-235-8440. Proceeds from this event will help support public service, scholarship and civic activities. VE exams contact is *Joel Curneal N1JEO, 203-235-6932*. E-mail

[NutmegHamfest@qsl.net]; Web site [www.qsl.net/nutmeghamfest].

#### OCT 20

**QUEENS, NY** The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot, Flushing Meadow Corona Park, 47-01 111th St., Queens NY. Doors open for vendors to set up at 7:30 a.m. Buyers admitted at 9 a.m. Free parking, door prizes, food and refreshments. VE exams at 10:00 a.m. Admission by donation, buyers \$5, sellers \$10 per space. Talk-in on 444.200 rpt. PL 136.5, or 146.52 simplex. Web site [www.qsl.net/hosarc]. For further info, call at night only: *Stephen Greenbaum WB2KDG 718-898-5599*; E-mail [WB2KDG@Bigfoot.com]. For VE exams info call *Lenny Menna W2LJM, 718-323-3464*; E-mail [LMenna6568@aol.com].

**SELLERSVILLE, PA** The RH Hill ARC will host a hamfest at Sellersville Fire House, Rt. 152, 5 miles south of Quakertown and 8 miles north of Montgomeryville. Talk-in on 145.31. VE exams 10 a.m. to 1 p.m., all classes. Bring documents! Indoor spaces \$12 (table included), outdoor \$6, bring tables. Admission \$5. Call the Hamfest Hotline: *Linda Erdman, 2220 Hill Rd., Perkiomenville PA 18074*. Phone 215-679-5764. Visit the Web site [www.rhfill.ampr.org].

#### OCT 26

**RICKREALL, OR** Mid-Valley ARES will present its 8th annual "Swap-Toberfest" and Amateur Radio Emergency Services Convention. The Convention will be held on Saturday, Oct. 26th, at the Polk County Fairgrounds in Rickreall. Doors will be open for the convention from 9 a.m. to 3 p.m. the day of the event. Swap table setup will be from 6 p.m. to 8 p.m. Friday night, Oct. 25th; and at 7 a.m. on Saturday morning, Oct. 26th. Self-contained RV spaces available. Talk-in on the 146.86 rpt. PL 186.2. Features include swap tables, commercial dealers, meetings and seminars. Additionally, emergency communications vehicles will be on display from Marion and Polk County Emergency Management, Civil Air Patrol, American Red Cross, and others as available. For more info contact *Dean Davis KL7OR, 503-540-3270*, or E-mail to [kl7or@arrl.net]. To download a copy of the flyer and pre-registration form (or register online), surf the net for [http://www.qsl.net/w7oem/swaptober.html].

#### OCT 27

**CANTON, OH** The Massillon ARC will present their 42nd annual hamfest, "Hamfest 2002" at Stark County Fairgrounds, 305 Wertz Ave. NW. From I-77 N take the downtown exit, turn left (W) on W. Tusc., turn right on Wertz to

Continued on page 59



## Converting Surplus: Overview Covering Coaxial Relays

*Converting surplus equipment has always been a fascinating event, both in the converting and the hunt to locate items to convert. What then do we convert?*

Well, we convert the things we can find in surplus, scrounging the scrap dealers and swap meets, looking for candidates upon which to work the fine art of reconstruction, to turn that junk into gold. I am not into collecting old fishing lures or going to sporting events. Maybe I am tweaked towards bias, but professional sports are more big business than sporting events.

### A point of view from a test equipment junkie

What gets me up and going, besides my very active grandchildren, is the hunt for a choice piece of microwave surplus material that can be modified into something

useful. It would be nice if whatever was located in surplus functioned as is, but then that would take the fun out of the hunt and reconstruction. What then can be found in surplus that seems to be overlooked?

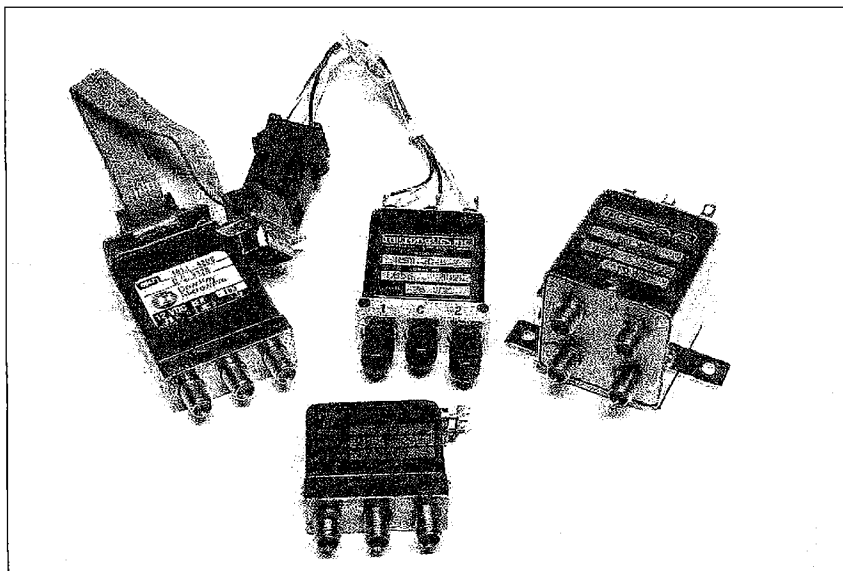
The first major thing that I have observed is coaxial relays, especially the 24-volt-actuated SMA postage-stamp-size microwave variety. Most people shun them for several reasons, with the main one being that they don't operate from 12-volt DC. There have been several articles on how to disassemble these expensive microwave relays and rewind the coil for 12 volts DC. I never did that, as it seemed to be too much trouble. A solution, but not for me. What then?

### Finding a solution

Creating a 24-volt power source to operate these fine relays seemed a project worth taking on. Not wishing to use extra power from batteries for portable operation, main operation from 12 volts was desired for all units constructed. A simple DC voltage booster needed to be developed. In scrounging local sources, I located several DC-to-DC power converters of small physical size that were fully isolated input to output. Of course, if a 12- to 24-volt converter could be located, problem solved. Other alternatives should be explored using other voltage supplies.

A 12- to 5-volt isolated power supply (DC-to-DC power block) seems to be common at most surplus scrap dealers, and can be utilized by stacking the 5-volt output on top of the main 12-volt DC input, creating a +17-volt line for relay switching. Using 24-volt coaxial relays and operating them on 17 volts seemed reasonable. Of 8 relays tested, 4 relays operated from the 17-volt supply. The remaining 4 relays functioned with 19 volts DC applied.

All relays tested in this batch were standard operating relays. DC voltage was applied to switch from Rx common mode to Tx mode. Another type of relay looking similar in physical appearance to the above relay is what is called a "latching" relay. I located some at our local swap meet and purchased the batch. These latching relays were cursed with the old stigma of a 28-volt DC coil. The swap meet seller wanted \$5 each for them because wire ends were still soldered to the relays. Such a deal! I counteroffered three for \$10 and he accepted, so I took the 6 relays he had.



**Photo A.** Picture of a few varieties of SMA coaxial relays. From left to right: SMA SPDT latching (left and center top) and a 4-port SMA transfer relay (right top). Standard SMA SPDT 24-volt relay center bottom. All relays rated to 18 GHz.

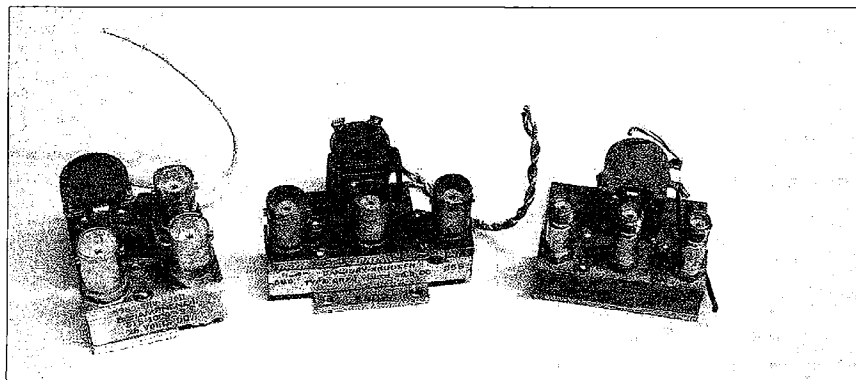


The relays obtained were Micronetics RSM-2D-L-I type. Without a spec sheet and many no hits searching on the Web for details, I powered them up with my bench supply to test for basic operation and switching contact integrity. They all worked just fine, latching and all. Latching, by the way, means the switch will remain in the selected position even when the DC voltage is removed. To transfer back to its original position another pin needs to have DC applied and it switches back. Again, the DC voltage can be removed and the switch stays in the new latched position — quite a current-saving feature. Nonlatching relays require voltage to be applied all the time the relay is in operated condition. Then when relay voltage is removed, it returns to normal receive condition with no voltage applied. Latching relays require a pulse of DC voltage to toggle to a set state, and no current flows after the latch functions. To go to the other state, it needs a pulse of DC voltage on another control pin and the relay latches in the other state and opens current flow in a new state of operation.

I decided to try the latching relays at a lower voltage switch point and tried 17 volts that I had just used for the other relay tests. All relays latched and switched just fine — no hang-ups or false operations. I set up a simple lamp circuit to watch opening and closure of the SMA relay contacts and finally assured myself that the relays would function not only at 17 volts, but at 12 volts, too.

What a stroke of luck. Every trip foraging through surplus material does not always turn up a gold purse for the search efforts. Many trips turn up nothing. Not to mention trips that did not pan out. If you keep your failures secret, many will think you are a surplus junk man extraordinaire, when in reality what is happening is that a few good trips make up for the many that might have supplied you only with information on new items yet to be received. The early bird gets the worm scenario works here most of the time. If you snooze, you loose. Check out your local swap meets. Lots of dead searches and nothing found, but persistence will pay off, occasionally allowing you to hit the jackpot. It just requires dedication to the search to locate parts inexpensively.

Why, then, was I excited when I located SMA postage-stamp-size microwave coaxial relays? Why not get excited about some BNC or type “N” connectorized coaxial relays? Well, being into microwave operations from 1296 MHz to 10 GHz, it is my opinion that the SMA relay rates



**Photo B.** Picture of high-loss BNC relay not usable at 1296 MHz (center top), better suited for low frequencies like 50 or 144 MHz. An early SMA version of a better-than-BNC relay, but still not top performer above 1 GHz, is at far right.

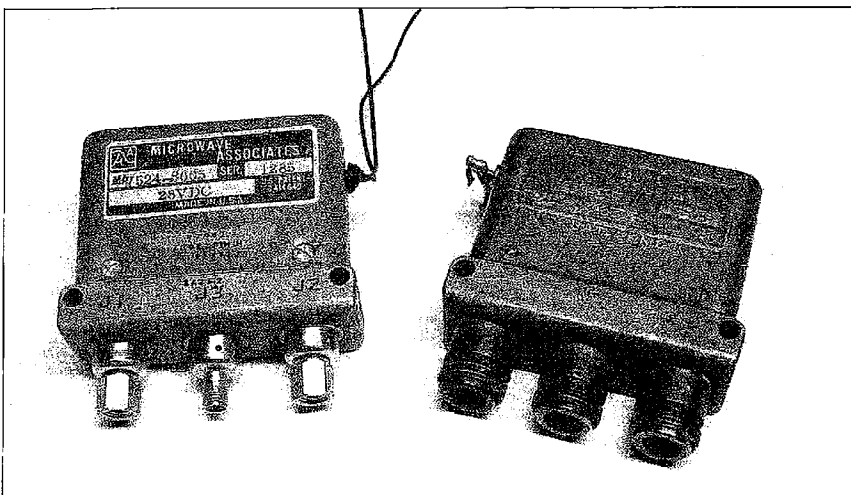
supreme. They are small, low-profile switches that use a microwave-rated miniature connector. They have been tested to have only a few tenths of loss through the relay contacts and most will handle at 10 GHz, 10 watts of power. It's very important when generating power at microwave frequencies as it is precious and you don't want to give it up to excess loss in components used.

Let's take the common BNC coaxial relay found in many surplus shops and equipment stores, and look at a recent conversion I checked out for performance. The unit I tested used four BNC relays constructed in a 1296 MHz transverter. The four BNC relays in this converter design switched a 1-watt power amp in and out of the circuit and then switched the receive preamplifier back into the antenna after the transmit relays released. I tested the circuit performance and found that I could only get one half of a watt output on the antenna connector and sensitivity was low in receive.

Checking loss through the relay contacts, I found that each BNC relay and associated coaxial cable and connectors contributed about 1 to 2 dB of loss at 1296 MHz.

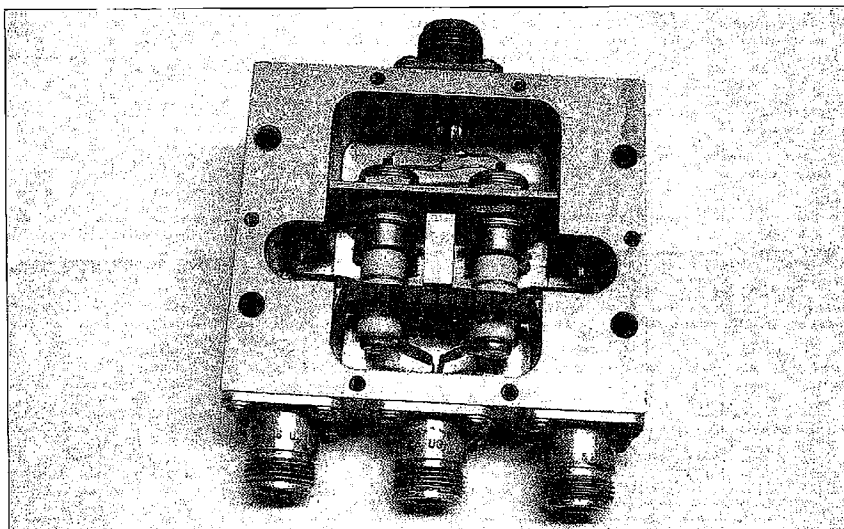
I tested the BNC relays at 2 meters (144 MHz) and found that the loss was a few tenths of a dB. Not wishing to add relays for VHF use to the junk box, I dumped them. When I checked a large “N” connector-type relay, I found a few tenths of loss at 1296 MHz and good isolation between the switched side and open port of the relay. However, I did not want to use a relay as large as the “N” connector unit and thought it would be better to shift them from high power applications for HF to low microwave frequency use. The SMA relay still reigns supreme due to its very low loss miniature size and great isolation between ports at all microwave frequencies from DC to 10 GHz. Some premium types are rated to 26 GHz.

After rebuilding the 1296 MHz converter and removing all the BNC relays, I was able



**Photo C.** Picture of large, high-power “N” connectorized on right, and SMA version of same relay on the left. Both rated to 2 GHz for reasonably good performance. Just large and high-power.





**Photo D.** Very high-power coaxial switch constructed with vacuum relay contacts for very high-power handling RF switching capabilities. These types of relays use vacuum switch contacts and solenoid driver coils, which are totally replaceable. Photo with cover removed shows the white ceramic body of each switch element for a single pole double throw (SPDT) coax relay. This coax relay is getting high-tech and very high-power.

to improve the receive sensitivity some 4 dB on transmit and now have 1.2 watts of power output on the system. Removing the BNC relays and their high switching loss did the trick. By changing the circuit's switching configuration I was able to use only one SPDT SMA coaxial relay to do all the switching. I deemed it was not necessary to switch the preamp and power amp, and let the coax switching take place on preamp in and RF out to the antenna. With the old design using BNC relays, the isolation between preamp and the power RF

amplifier would have been very poor and possibly destroyed the RF preamp if switching were done with a single BNC relay. Isolation at 1296 MHz with the SMA relay measured in excess of 30 dB loss between the switched side of the relay and the nonswitched side.

The bottom line with RF coaxial relays is to pick up what you can for your projects but have a handle on which type will better serve your application and frequency of operation specifications. Yes, the SMA connector is the best choice for micro-

wave frequencies. Power specifications roll off as frequency is increased. I haven't observed any real problems running 10 watts of power at 10 GHz. I would not try to push ratings and go for the maximum power, as I am a conservative user and believe in not pushing the maximum envelope. Do I use an SMA relay for switching the 1 and 5 watt amplifiers described in last month's 73 Magazine column? You bet! SMA forever.

Some general rules on SMA coaxial switches are: (1) Small size can handle higher power levels, with some manufacturers claiming several hundred watts at VHF and derated in power at 10 GHz to the 20-watt range. (2) Isolation or crosstalk between open and closed side of the switch is rated in dB and can be as great as 50 dB in some relays. These are maximum ratings for certain types, and I recommend not pushing any device to its maximum ratings.

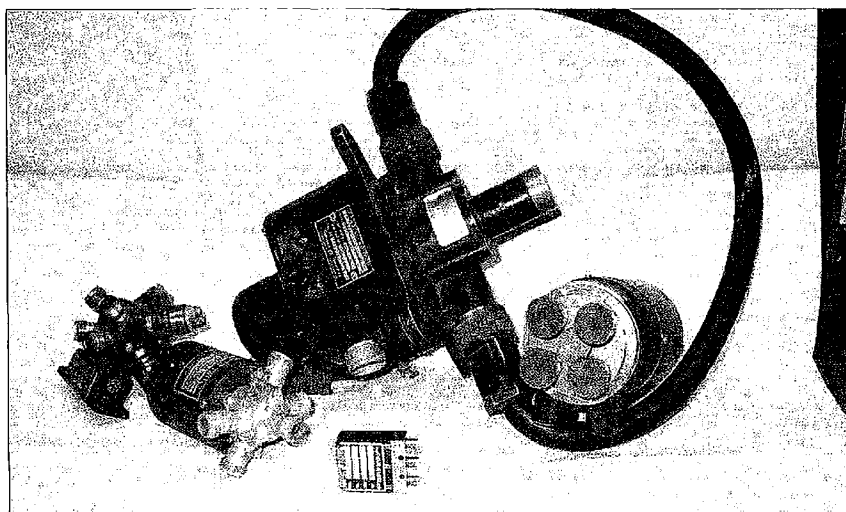
"N" type relays are rated in the 500- to 1,000-watt range at HF/VHF and are reduced in power to the 50- to 100-watt ranges at frequencies of 2 to 3 GHz. Typically, they are large in size and can be outfitted with SMA connectors as shown in **Photo C**, if you look close. I don't try and push ratings, and I reserve this type of relay for HF to 1296 MHz high-power rigs.

**Photo E** shows the largest coaxial relay in my collection. It weighs in at 7 pounds, and that's without connectors attached. It's made for very-large-diameter one-inch helix cable for industrial high-power switching. A centerpiece to be sure of, or a great door stop if you're not into very high-power relays.

BNC and related UHF connectors and associated relays are better left for 2 to 30 MHz for the purist. Yes, I know they are used at much higher frequencies, but compared to "N" and "SMA" types, the BNC and UHF connectors are left in the dust. If you locate a relay and want to determine its ratings, try searching the Web for its original manufacturer. However, it might be difficult, as most companies have merged or just gone away.

As with all projects, and especially amateur microwave-related items covering this coaxial relay application, I will be glad to answer questions. Drop me a note on E-mail to [wb6igp@ham-radio.com].

Well, that's it for this month. Coming up, I will be covering usage of microwave attenuators, detectors, and other coaxial test devices. 73, Chuck WB6IGP.



**Photo E.** Now, just when you think you have seen everything, here is a coaxial relay, with connectors, that weighs in at seven pounds. A short section of coax cable is attached with connectors on each end, contributing a half pound. Consider this relay in the multi-multi-kilowatt level. Shown with smaller "N"- and SMA-type relays for size comparison; miniature SMA shown center front is 1-inch square.



## Digital Imaging and SSTV

*There are, I am sure, many of you who fall into my way of thinking about the written word. After all, that is much of what this digital communications is about. We sit down and type in a lively fashion to each other as a simple matter of course. Many of us spend very little time with voice communication. Even those who practice the art of CW without the help of the modern software either manually or mentally write the encoded message.*

If you will bear with me for a paragraph or two I will tell you a few recent experiences concerning this month's subject. Many of you will recall some references I have made to the WinLink2000 E-mail system used by RVers and maritime hams to keep in touch when away from their home base.

A few months back, one of the boosters of that system came to town and we had a pleasant chat here in the shack. Cliff KD4ZPB and his better half, Virginia, travel the continent full-time in their fifth wheel and, of course, are users of the WinLink2000 system.

While Cliff was here, I was demonstrating some of the other digital modes available for the use of hams, and realized this was the first time he had seen SSTV. At least, it was news that it wasn't something relegated to UHF as is ATV (real time moving pictures).

This put a little bug in the back of my head. There are probably a lot of you folks who are all set up on the soundcard modes who have no idea how much fun you are missing out on by not sending and receiving images.

This comes a little closer to home when I receive requests for recommendations for PSK or RTTY, and then the correspondent includes SSTV. I wondered about this a little. The reason seems tied to the fact that the recent digital explosion has brought back many inactive hams who at some time had at least a passing interest in SSTV along with the modes they were running on some other hardware called a TNC.

This falls together when you realize that it wasn't too long ago when SSTV required its own hardware. Now, as I said, if you are into PSK you are just about there for SSTV as well. The only little extra needed is to

get the microphone so you can shut it off when you transmit an image. And that means is available with many of the commercial interfaces if you don't want to roll-your-own switching system.

The reason I mention the mic problem is that any shack audio, especially digital tones from your computer speakers, really screws up the image you are transmitting if you don't shut the mic down. The other side of the coin is you will need the mic when working SSTV because, in normal cases, you will be using SSB communication in between the image transfer process periods.

So, what I am saying is, if you are doing digital soundcard communications and want a little extra color in the shack, you are probably only a switch away from that capability. Speaking of color, I have a description I use for SSTV images in general when I want to explain what it is akin to. I simply state it is much like a color fax.

I have never seen a color fax machine and do not know if they exist, but the time spent to send a regular fax over the phone line and sending a color image over HF is similar, but the quality of the SSTV over a good path is a thrill to experience.

What brought me to revisit this subject is the XYL (Janet) decided it was time to get me a digital camera. I suppose it was due to a number of hints about "bargains" I was seeing and the fact we were already able to print good quality images on glossy paper from our HP color-sprayer-type printer. It is a very good printer and was reasonably priced a year or two ago. I see printers devoted entirely to this process but this one is very adequate and does all we demand of it.

Janet picked out one that was in the \$250 range and asked me to check it out. I was of the opinion that was a few dollars more than

necessary, but it proved to be priced about as well as could be and was locally available, so the purchase was made.

The learning curve was not too bad. The settings are available by reading an LCD screen on the back and are fairly intuitive. The packaged software allows an ease of printing multiple images on one sheet of paper. And that is about the best I can say for the included software. Any real editing is best done by other software.

The other software can be whatever you prefer. There are some really great programs out there at numerous hundreds of dollars and they are mostly for the professional art folk who have some distinct needs.

I have a \$100 program named Paint Shop Pro. I have version 6 and understand there is a version 7 available. I don't know if I have any reason to upgrade. The "wimpy" version I have does all I can understand, doesn't crash and the results are excellent. Think I will stay put.

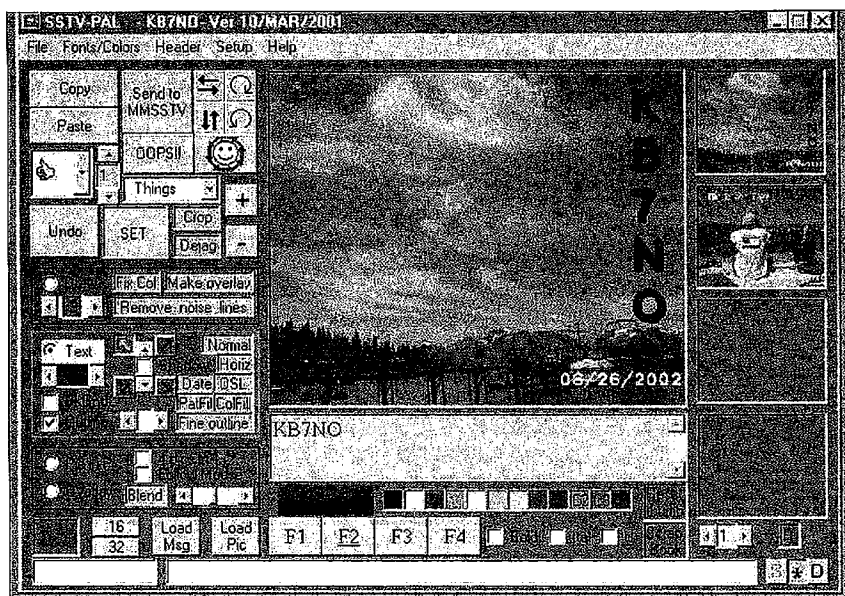
### What I learned

There is a lot to get under your belt (but it is really easy) if you want to process images and print them at home. The first images we snapped needed some retouching because we were trying too hard to give this thing the "real test." It was necessary on the first batch to learn it all at once.

This was okay, but if you will just not get so serious with your digital camera, you can simply use the included software package and send images out to your compatible printer with the glossy paper loaded and the results are quite good. Subsequent batches have proven that for me.

One important phase of the learning curve had to do with what I call resolution, or quality, or as the camera folk insist, simply





**Fig. 1. SSTV-PAL** — This freeware editor does almost everything you want from a graphics program. One thing makes it better — it is designed for the ham who does SSTV. It comes with a help file and, even more helpful, if you click Tooltips ON in the Help menu the program is very intuitive. That is, you move the cursor to a button or pane and instructions display immediately to guide your work. The program is excellent for on-the-fly edits such as inserting your callsign or any small message. Simply type it in the box where KB7NO is displayed and left click on the image and your text is inserted at that point. One click on the little box that says "Horiz" and the text can be toggled to horizontal. Another click and it is vertical again. See article text for file handling, font selection, cropping, image enhancement and returning quickly from goofs. More tricks available than can be explained in one article.

megapixels. They could get a little clearer on this subject but I think they fear drowning us with facts.

What I find is this camera claims 3.1 megapixels. Its only format is JPEG and the images import into the computer at 72 pixels per inch. This can lead to a very grainy image under some circumstances. However, these images measure 30 inches by 20 inches when inspecting with the real graphics program. No one (practically) is about to print anything this size.

What you usually print is something in the range of 4x5 to 8x10 inches and you use the entire image which then is squeezed down to fit and the pixels per inch increase handsomely. You have good resolution as long as you play by the camera people's rules.

If, on the other hand, you crop (trim the excess) down to a small portion of the original image and print, the result lacks all those extra pixels you just X-cd out and can become a bit grainy. This is especially true if you take that small remaining image and blow it up to an 8x10.

Fortunately, not much of that kind of editing is done with images you want to send via SSTV. The SSTV programs we have

available handle these large images similarly to the print options I was describing and the resolution is excellent.

To be honest, unless you have a terrific path, the noise lines in your received image can be much more annoying than a grainy image. Don't get me wrong. You will, on a good day, be amazed at the quality of images you can receive on SSTV.

### Now for the fun and the free stuff

What makes SSTV a lot of fun is the editing you can do before you send the image. There is some great software available to accomplish this. In reality, you can get along just fine with most digital images once they are in your computer with a couple of free software packages made especially for SSTV.

Importing the digitized images to your hard drive can be a challenge. One reasonably priced method is to use one of the low-cost flatbed scanners available these days. Somewhere in the \$100 area will get you a fair to middlin' scanner that will suffice to scan photos that you feel are interesting. There are cheaper digital cameras than the one I just got that will do the trick. I see

some in the \$150 bracket that are good enough for the job.

Incidentally, the price keeps going down on cameras as the technology improves, so it is not a good time to buy top of the line. One of these days the technology will improve so you can take a shot of that small child when it smiles — before it simply walks away from the camera as the current technology makes up its mind to snap the shot. I think that is a few years away, so in the meantime, be satisfied to take more predictable, nearly still shots.

The cameras available today will stop an action shot just fine. I did that with a granddaughter who was running across a field the other day and it was not blurred, she was simply about twenty feet closer when the camera finally decided to capture the action.

You will need a method of inserting your callsign and or comments and other minor amendments to the images. I have found the SSTV-PAL program does this very well and it is a marvelous freebie available from [<http://users.origin.net.au/~crac/>].

This is a terrific little program that works with several SSTV programs including MMSSTV, another freebie, which you can find at [<http://www.qsl.net/mmhamsoft/>].

With this arsenal of software and a few digital images on your hard drive along with the "normal" lash-up for PSK or other digital modes (and the aforementioned mic switch), you are about in business to have some fun with SSTV.

### The process

Since a lot of the steps to making images ready involve file retrieving and saving, I will run through this process as it works here, hopefully not belaboring a mundane subject. But it may be helpful to some who need help in this area.

I have only downloaded images from two different cameras into a computer, so I have not seen them all. However, that is one of the parts that is usually easy. The step that can become difficult is finding them when you want to import them into some editing program and/or your SSTV communications software.

The camera I am using is a Kodak and it states in the user's manual (in fine print) that the images will automatically be stored at [C:\Kodak Pictures] and sure enough the software supplied by the camera manufacturer creates a folder named by the date of image file download and inserts it in the Kodak Picture's directory. Easy to find thereafter for your export to your special editing purposes.



## Fun part begins

I just downloaded a set of images from the camera that includes a shot of Lake Tahoe with some interesting cloud formations and wanted to see what the camera would do with those, so we will work with that image. I brought up the SSTV-PAL program to edit the image.

In SSTV-PAL I clicked "Load Pic" in the lower left corner and this caused a file structure tree to pop up in the lower right corner of the program display. Clicking on "C" got me to a default directory for SSTV-PAL which was not where I wanted to go. So I clicked C again and the C root directory displayed and then I merely needed to scroll down to the Kodak Pictures folder, double click on that, and the folder with the appropriate date displayed.

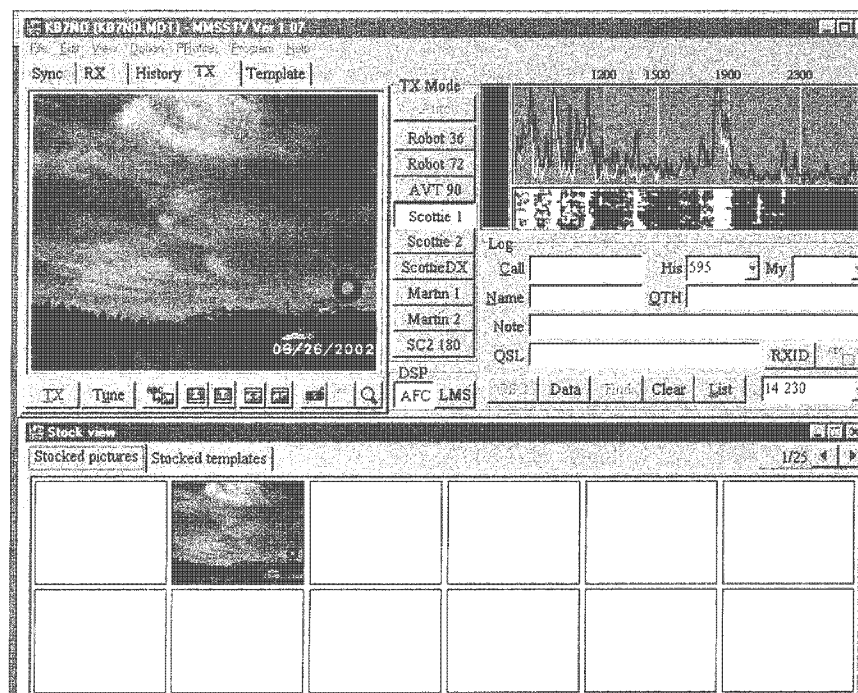
Since all the files are in the .jpg format, it was necessary to click the little JPG box next to the directory display and the images were displayed by number. One step I left out was at the very beginning. I had viewed this dated folder in the Win98 Explore mode and identified the image by number. That is easily done because Win98 graciously displays images as you click on the file numbers. That is how I knew which image number to bring into SSTV-PAL. Double clicking on an image file imports it.

With this image, all I wished to do was add my callsign. Many other effects and changes are possible. To do this, I clicked "Exit Pic" to remove the directory display, and then "Text" which is about a third up from the bottom on the left margin.

This brought up an intuitive gray box directly under the image. Intuitive I say, because the default text in the box says "TYPE HERE." You delete those two words with your cursor and delete key and type in what you want. In this case, it was simply my callsign. Below there, you may choose the color for your text.

All that is necessary to get the text in place in your image is to position the cursor and left-click. Could not be any quicker or easier. Plus, once you have discovered how easy it is to place the text in the wrong place, you have a couple of options to remove it and try again. Right click will do it, or the "OOPS!!" button will also remove the last change you made. A little experimenting is fun and doesn't cost a penny.

You may be wondering how to change the type size, etc. Simple enough, but I had to read the Help File. Simply right click one of the F1, F2, F3 or F4 buttons below the color selections and your Windows Font menu will appear. Then you can choose a font from whatever you have available and



**Fig. 2.** Ready for Xmit. This is the freeware MMSSTV with the edited image as it was sent from SSTV-PAL. This program is an excellent package for the ham who is using the soundcard communications software for PSK and other such modes. If you are already doing PSK, you are ready except for switching your mic off while transmitting images (see text). If you have not yet experienced SSTV, reception is easy. Simply download the software, install it and tune to 14.230. Those strange warbles will suddenly become pictures right before your eyes. That's about all it takes to give you the bug!

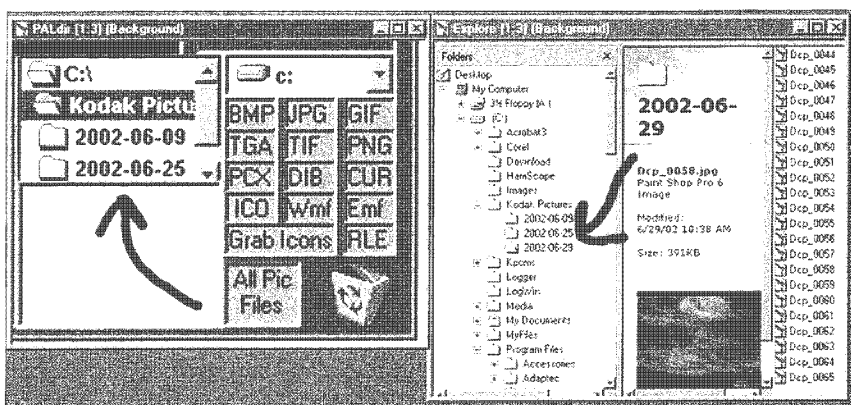
adjust the size while you are at it. Also, to the right of those buttons, there are the options for bold, italic and underline.

### More quick options

This little editor gives you so much power

you might be tempted to use it for all your graphics editing. It does have some limitations, but if you have no other graphics program it is pretty darn good once you discover the possibilities.

Continued on page 59



**Fig. 3.** File import with SSTV-PAL — This is a composite of the little corner of the SSTV-PAL displaying the directory tree and the Windows Explore tool doing the same thing. Though the display on the right is more detailed, you can see they are really finding the same location. Just as an aside, I drew these arrows for emphasis, but the real reason, is this is something you can do with the SSTV-PAL software. Drawing with a mouse is not my best art effort but, again, if you goof, removal is only a click away. Just another fun thing to do with your images. The more toys you learn to play with . . . Fill in the blanks.



## Field Day 2002

*It was the best AMSAT Field Day since the days of AMSAT OSCAR-13. It was also the first Field Day for AMSAT OSCAR-40. Numerous stations in North America were expecting great things from AO-40. They were not disappointed.*

But there's more. Just before the beginning of Field Day, Pat Gowen G3IOR sent E-mail to [amsat-bb@amsat.org] about slow CW, 3-digit number groups he had received on 145.974 MHz. The transmission exhibited Doppler shift during the 11 minutes that Pat could hear the signal. Was it another illegal ham-band interloper, or signals from the past? Field Day was quickly forgotten when the truth was discovered.

Field Day is one of the most popular on-the-air contests/activities in amateur radio. It is held each year on the fourth weekend in June. The event is sponsored by the American Radio Relay League (ARRL) as an emergency preparedness exercise. During the 24-hour period, US. and Canadian participants strive to make as many contacts

as possible operating in remote locations from tents, campers, vehicles, or just a simple set up in the middle of a field.

The ARRL Field Day rules consider the amateur satellites as a separate band and provide a 100-point bonus for the first satellite contact. The Radio Amateur Satellite Corporation (AMSAT) version of the event considers each satellite as a separate band, encourages international participation and has additional rules for digital communications. Many Field Day groups have made efforts to put more emphasis on their satellite stations, both for ARRL points, and to simultaneously make contacts in the AMSAT competition.

### Field Day 2002 via satellite

Last year AMSAT OSCAR-10 was surprisingly good. This year however, AO-10 was silent. This 19-year-old hamsat can be quite unpredictable since the onboard computer gave out over a decade ago. It is simply an uncontrolled, but functional Mode "B" (70 cm up and two meters down) transponder in space. Taking it's place this year was AO-40. Putting together a small, portable station for AO-40 is surprisingly easy. In place of the large two-meter beam required for AO-10 downlink signals, a small dish-style antenna with a 2.4 GHz to two-meter downconverter does the receiving job, while a typical 70-cm satellite yagi takes care of the uplink. Some stations on Field Day used the L-band AO-40 uplink with appropriate dishes or Yagis.

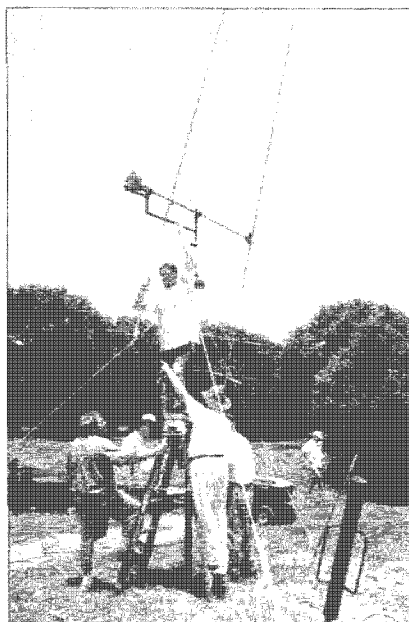
The Fuji satellites, F-O-20 and F-O-29, were both in analog (SSB and CW) mode for Field Day. Contacts were plentiful for those that were prepared for the exceptional Doppler shift associated with the 70-cm downlink. The signals can drift as much as 20 kHz in the course of an overhead pass.

Satellite newcomers had problems keeping up.

The Russian RS-12/13 hamsat was "OK" for Field Day, but due to the activation of the 15-meter uplink (Modes T and K), it was difficult to get more than a few contacts. It's hard to tell the difference between satellite operators on the 15-meter uplink and the HF crowd that are inadvertently retransmitted. There have been no reports of any successful RS-15 contacts during Field Day 2002.

Operation via UoSAT-OSCAR-14 was once again, as expected, super crowded! This single-channel FM Mode "J" (2 meters up and 70 cm down) repeater in the sky was

*Continued on page 50*



**Photo A.** Ron AG5RS makes antenna adjustments at the K5OE Field Day 2002 site.



**Photo B.** An elegant system for L-band uplink and S-band downlink for AO-40 operation during Field Day 2002 at K5OE.





**Photo C.** Close-up view of the dual band (L. & S) circular patch feed on the AO-40 dish.

## HAMSATS

*continued from page 48*

working well even though it sounded like hundreds of stations were trying to access the satellite simultaneously. The result was that only a few contacts are made, usually by the stations with the biggest antennas and the strongest transmitters. It was wild, but at least it was only temporary. Unfortunately there were a number of stations trying to get their 100-point ARRL Field Day bonus using HT's and small beams. Most were disappointed, but changes in the AMSAT rules made it possible for at least a few more stations to make contacts with something less than monster antenna arrays and high-power two-meter amplifiers. The modified rules specify that each station is allowed credit for only one contact per FM satellite during Field Day. Participants were encouraged to make their single contact and move on to other hamsats for the duration. Some exceptions were heard, but the really "big guns" followed the recommended procedure, made their one contact, and left.



**Photo E.** One of the other well-equipped hamsat stations at the K5OE Field Day 2002 site.

UoSAT-OSCAR-22 was the only active 9600-baud digital satellite. For the duration of the event, stations did their best to upload a Field Day greeting message and download as many as possible. Rule changes put in place for Field Day 2000 allowed digital contacts that use the amateur-radio satellites as flying digipeaters. UO-22 supports this mode in addition to its BBS-style system.

PCSat (NO-44) was only active for one pass at the beginning of the event this year.

Although contacts with the International Space Station were not counted for AMSAT Field Day operations in 2001, they were in 2002.

Valery was operating Field Day from the ISS this year. Many stations simply quit making Field Day contacts long enough to get some personal QSOs with the ISS.

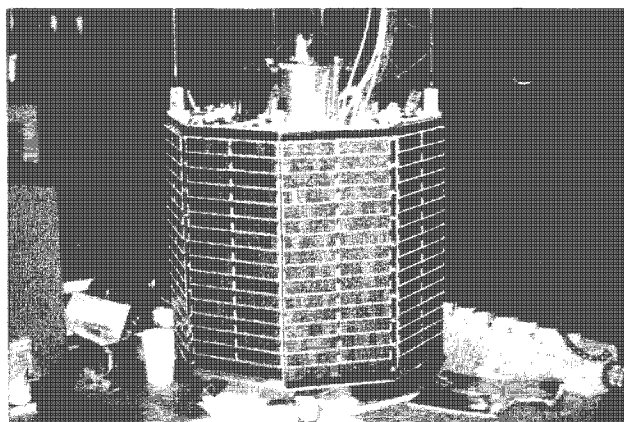
## The Houston connection

The Houston AMSAT Group had decided months in advance of Field Day to have a hamsat-only outing using the callsign K5OE (Jerry Brown). Three stations were commissioned to cover all of the analog and digital satellites. The primary radio for AO-40 and UoSAT-OSCAR-22 was a Kenwood TS-2000 with 1.2 GHz module. A pair of Yaesu FT-847's were set up for all of the other satellites.

While the two complete arrays of KLM two-meter and 70-cm Yagis looked impressive, the five-foot dish with a dual-band (13 and 23 cm) circularly-polarized patch antenna was something to admire. The basic design was from K3TZ, but Jerry K5OE and made it a dual-band unit. A 1.2 GHz linear amplifier at the base of the dish provided plenty of power for the L-band AO-40 uplink. A 100-dB G3WDG filter in the 2.4 GHz line kept the uplink from blowing



**Photo D.** Jerry K5OE snags another one during Field Day 2002.



**Photo F.** AMSAT OSCAR-7 on the test bench prior to launch in 1974.





**Photo G.** AMSAT OSCAR-7 at the thermal vacuum chamber with Karin and Karl Meinzer, Marie Marr, Jan King and Perry Klein, in 1974.

out the DB6NT preamp and Drake downconverter.

The main KLM antenna array was computer controlled with a UNITrack interface. Tracking software included WinOrbit and InstantTrack. The 9600-baud digital system ran on WISP while PCSat work was accomplished with Windows Hyperterminal. The Kenwood TS-2000 has a built-in 1200 and 9600-baud Terminal Node Controller (TNC).

Most of the gear worked very well with the exception of some problems with the rotators on the second KLM array, the

occasional Longhorn bull, mosquitoes, the Texas heat and the occasional attack from our host's (Ron AG5RS) killer pug dog. High points of the outing included the air-conditioned tent, a fantastic generator, great radios, excellent operators, no rain, the swimming pool and the Texas BBQ. We're doing this again next year. While sunspot cycle 23 has started its decline, the hamsats are looking and working quite better all the time.

### The surprise

AMSAT Board Member and Vice President of User Services Bruce Paige KK5DO

was at our Field Day site this year, but left early due to other commitments. Just after we cleared the site to head back to town, Bruce called on the cell phone to tell us that AMSAT OSCAR-7 was on the air. What??! The last time anyone had heard AO-7 was in June, 1981. How could this be? I rushed home with the orbital data relayed by Bruce and made my first AO-7 contact since June 11, 1981. Unbelievable! The signals were acceptable on my home station using the Mode "B" 432 MHz uplink and 145 MHz downlink. Chirp was noted on CW and the SSB voice signals warbled, but it worked. Weeks later AO-7 was still working, and may be with us for a while, during its second life.

When AO-7 (known as AMSAT OSCAR-C prior to launch) went into space as a secondary passenger on a Delta rocket from Vandenberg Air Force Base in Lompoc, California, on November 15, 1974, there were no PCs, cell phones, and most home rigs still used tubes. AMSAT OSCAR-6 had been launched two years earlier, but AO-7 was an advanced, multi-band hamsat with a projected lifetime of three years. When the satellite went silent (for the first time) after 6.5 years of operation, it had been running only on solar cells for a few years. One of the nickel-cadmium batteries had gone open circuit allowing the satellite to work only when illuminated by the sun. The end came when that cell shorted, or at least that's the theory.

Studies of the current CW telemetry from AO-7 show that one of the battery cells has once again opened up, thus allowing the solar panels to pass their energy on to the satellite's transponders and control systems. A satellite in space goes through thermal stress as it constantly transitions from light to dark, and back again. This stress may have been the catalyst that caused the cell, or some other cell in the string to open up. ALL of the major subsystems in AO-7 are apparently working, at least when the satellite is in sunlight. It is hoped that the batteries stay the way they are for a long time to come.

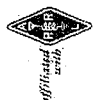
### Working OSCAR-7

First load up on information and be prepared for any of AO-7's modes. The best source of information is the AMSAT Web site [<http://www.amsat.org>]. There you will find frequencies, operating tips, telemetry descriptions, the satellites specifications, old photos and a lot of history. AMSAT is even promoting a new award for seven confirmed contacts via AO-7 in the 21st century. They have also reprinted the AO-7 SWL cards that

Index Name	Possible limits	Decoding parameters	Assignment of parameters
RS 21			Satellite callsign
UBS	N=100.. 150	U=N/10 Volts	On board voltage
IBS	N=10.. 250	I=N/100 Amperes	On board current
USUN	N=0.. 156	U=N/10 Volts	Solar array voltage
ISUN	N=0.. 255	I=N/100 Amperes	Solar array current
ITXA	N=0.. 170	I=N/100 Amperes	435 MHz TX D.C. current
PTXA	N=0.. 70	P=N/10 Watts	435 MHz TX UHF power output
TTXA	N=50.. 150	T=N-78 deg C	435 MHz TX temperature
ITXB	N=0.. 150	I=N/100 Amperes	145MHz TX D.C. current
PTXB	N=0.. 70	P=N/10 Watts	145MHz TX VHF power output
TTXB	N=50.. 150	T=N-78 deg C	145MHz TX temperature
TFLV	N=30.. 180	T=N-78 deg C	Top flange temperature
TFLN	N=30.. 180	T=N-78 deg C	Bottom flange temperature
TPPA	N=50.. 150	T=N-78 deg C	Instrument A board temperature
TPPB	N=50.. 150	T=N-78 deg C	Instrument B board temperature
MTX	N=0.. 255	Controller data	Housekeeping info
MRX	N=0.. 255	Controller data	Housekeeping info
RS 21			Satellite callsign

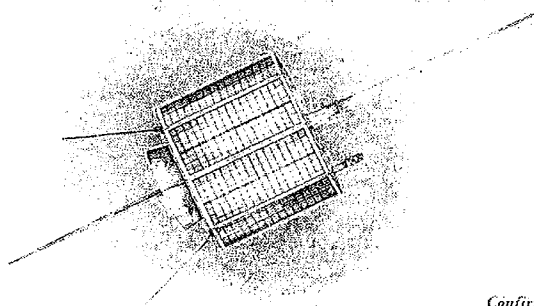
**Table 1.** This is the correct table for the Kolibri (RS-21) telemetry equations that should have been published in our July issue. Sorry about that.



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# AMSAT - OSCAR 7



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Confirming  
Reception By

**Photo H.** AMSAT OSCAR-7 Short Wave Listener's (SWL) cards are once again available from AMSAT.

were first introduced in 1974 along with photocopies of the AMSAT Newsletter from November, 1974, complete with many facts and history about the satellite.

When AO-7 first awakens after a period of darkness, it can come up Mode "A" (two-

meter uplink with 10-meter downlink), Mode "B" (70-cm uplink with two-meter downlink), Mode "C" (low-power version of Mode "B"), or Mode "D" (recharge). The 435.1 MHz CW beacon may also be heard when the satellite is in Mode "A" or Mode

"D". The letters assigned to the modes are from the labels of the flip-flop digital circuit outputs that turn on the specific transponders. Volunteer ground control stations began work in July to send commands to AO-7 for a less random operating pattern. A small number of the original control boxes still existed and were dug out of various garages and basements. Hams don't throw away anything.

Questions have arisen concerning the legality of the 70-cm uplink. The 432.125 to 432.175 MHz transponder input is no longer authorized for the Amateur Satellite Service, although it is still within the US. Amateur Radio Service. Fortunately, the FCC license for AO-7 has been maintained and is still active in the FCC system as W3OHI. For US hams, operation through the 70-cm uplink, is valid per the FCC license. Other countries will have to decide whether to "grandfather" AO-7 operations. For all hams though, it is a good idea to be a good neighbor to any weak-signal 70-cm

*Continued on page 62*

## AMSAT-OSCAR 7

A joint project of amateur groups in Australia, Canada, Germany and the United States, coordinated by AMSAT, the Radio Amateur Satellite Corporation.

**Launched:** November 15, 1974, at 17:11 GMT.

**Orbit:** 910 st. miles (1460 km) circular, sun-synchronous, polar orbit, 101.7 degree inclination, 114.99 minute period. Passes repeat on a two-day cycle around 8-9 AM and 8-9 PM local time.

**Size:** Octahedral (eight-sided) in shape, 14.17 inches (36.0 cm) high, 16.7 inches (42.4 cm) diameter. Weight: 63.7 pounds (28.9 kg).

### COMMUNICATIONS SYSTEM SUMMARY

#### Two-to-ten Meter Linear Translator (Operable in Mode A)

**Uplink:** 145.85-145.95 MHz, circularly polarized canted turnstile (use LHCP in northern hemisphere, RHCP in southern hemisphere); 80-100 watts recommended user EIRP.

**Downlink:** 29.40-29.50 MHz, 1-2 watts output, linearly polarized dipole antenna. A ten-meter pre-amplifier is recommended for reception. Telemetry Beacon on 29.502 MHz.

#### Seventy-centimeter-to-Two-meter Linear Translator (Operable in Modes B and C)

**Uplink:** 432.125-432.175 MHz, circularly polarized canted turnstile (use RHCP in northern hemisphere, LHCP in southern hemisphere); 100-200 watts recommended user EIRP.

**Downlink:** 145.975-145.925 MHz, 6-8 watts output (in Mode B) (3-4 watts in Mode C), circularly polarized canted turnstile (use RHCP in northern hemisphere, LHCP in southern hemisphere). 6-10 db of antenna gain is recommended for reception. Telemetry beacon frequency 145.972 MHz.

**Note:** Passband in this translator is inverted (USB signals become LSB, and vice versa). The use of USB for the uplink is recommended.

#### 435.1 MHz Beacon (Operable in Modes A and D)

**Output:** 435.103 MHz, 300 Mw, circularly polarized canted turnstile (use LHCP in Northern hemisphere, RHCP in southern hemisphere). 6-10 db of antenna gain is recommended for reception.

#### 2304.1 MHz Beacon (Operable in Modes A, B, C, or D)

**Output:** 2304.091 MHz, 40 mw, circularly polarized quadrifilar antenna (use RHCP for reception in northern hemisphere).

**Photo I.** The back side of the AO-7 SWL card provides complete data on the satellite's modes and frequencies.



## What's New in Transmitter Hunting?

*For many years, hidden transmitter hunting was one of the best-kept secrets in ham radio. From the 1960s through the '80s, it was rare to read about mobile T-hunts or on-foot foxhunts in ham radio magazines or to see a program on this topic at a ham radio convention, except in southern California. But things have changed for the better.*

The upsurge of interest in competitive radio direction finding (RDF) since "Homing In" first appeared in November 1988 has been steady. As more and more hams are discovering the fun, they are applying the latest technologies to make it easier for everyone to achieve success. There is a good chance that transmitter hunts are going on nearby. You may be able to get all the details at the next hamfest or ARRL convention in your state. For instance, there will be a three-hour forum at the Duke City Hamfest, August 23 in Albuquerque, New Mexico. There you can hear directly from the people who put on the First USA Championships last year.

### This plot isn't sinister

The annual Foxhunt Forum at the Dayton Hamvention® gets bigger and better every

year. The 2002 forum was a two-hour session with nine topics on the agenda. Hosts and organizers were Bob Frey WA6EZV and Dick Arnett WB4SUV of the OH-KY-IN Amateur Radio Club (Photos A and B). They began with the usual introductions and polls of the 150 attendees. Then Brian DeYoung K4BRI of Alexandria, Kentucky (Photo C) took the podium to reveal the details of his Polar Plot and Polar Plot 2 software, the first such programs to display RDF beam bearings on a "palmtop" computer or personal digital assistant (PDA).

Mobile T-hunters have long recognized the advantages of polar displays over the typical "turn it and read the S-Meter" approach. A polar display helps sort out unwanted signal reflections. They show up as momentary non-correlated spikes on a polar plot, compared with the steady lobe representing your RDF antenna's pattern

(Photo D). That lobe, when averaged over several blocks of driving, usually shows the correct direction to the hidden transmitter, unless you're in an area where direct signal is completely blocked and the only way that the signal gets to you is via a constant reflection from something big, such as a mountain.

Over the years, several polar display projects have been featured in "Homing In," starting with the motorized quad system of JaMi Smith KK6CU on the cover of the November 1992 issue. JaMi used the storage-scope display of a Tektronix medical monitor, powered by a DC-to-AC converter.<sup>1</sup> He won his share of southern California T-hunts with it, but he had to be careful that the high-current scope didn't drain his car battery.

Next came Jerry Boyd WB8WFK of Albuquerque, who was first to use a computer for



**Photo A.** Bob Frey WA6EZV of Cincinnati enjoys both mobile T-hunting and on-foot radio-orienteeering. For mobile hunts, he uses a doppler setup.



**Photo B.** Dick Arnett WB4SUV of Erlanger, Kentucky, works in a hospital, so it's no surprise that he uses a surplus medical monitor as a storage-scope display for polar-plotted RDF bearings. It's in the lower-right corner of this photo.





**Photo C.** Brian DeYoung K4BRI crosses the 80-meter finish line at the 2002 USA ARDF Championships in Georgia. He also likes mobile T-hunting with his computerized polar bearing display.

the display. His original version had a PC with 386 processor, which wasn't fast enough to trace the bearings for complete antenna rotations in real time. Over the

years, he has upgraded the computer and achieved much faster response.<sup>2</sup>

Next came RADAD by Tom King KA6SOX and Kerry Provancha KK6OS of Santa Barbara, California. RADAD displayed bearings on the long-persistence cathode-ray-tube (CRT) of a surplus marine radar set. The directors and trigonal reflector of their innovative motorized yagi revolved around a fixed vertical driven element, so no RF slip rings were required.<sup>3</sup>

Other polar display projects in "Homing In" have included the Foxcopter by Bill Rupp NØMKJ of Muskego, Wisconsin,<sup>4</sup> and an ambitious CRT whirligig by Dave Bullock G6UWO and John Wood GØPSI of Nottingham, England.<sup>5</sup>

Then there was my NorthScope, made from an old Heathkit SB-620 panadaptor with long-persistence CRT and a fluxgate compass sensor atop the hand-rotated RDF quad.<sup>6</sup> It shows azimuth-versus-strength in polar form like the others, but the circular display always has north at the top. That makes it easy to detect subtle bearing shifts as I drive the winding roads of southern California hills and mountains in the dark. I still use it on nearly every two-meter mobile hunt.

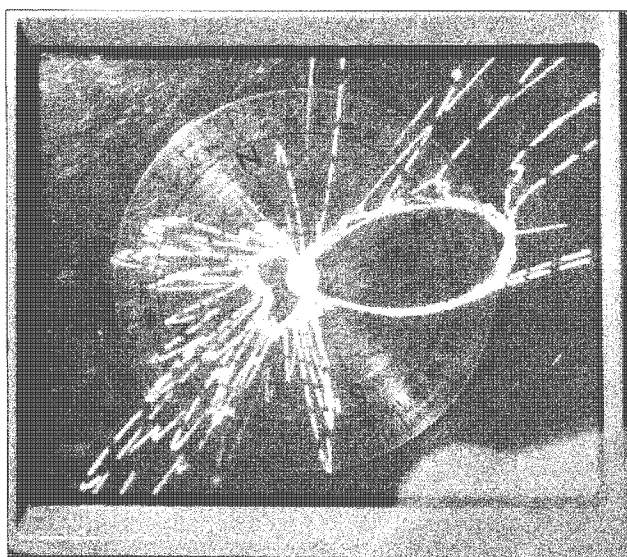
K4BRI says he first decided to build a PC and PDA polar display after seeing the mobile installation of Dick Arnett WB4SUV at a local T-hunt. Brian's first computerized version was more like WB8WFK's setup, with a continuous-turning potentiometer attached to the 8-foot rotating antenna mast supporting his 4-element 2-meter T-hunting

quad (**Photo E**). Brian tapped into the S-meter circuit of his Kenwood mobile set. He only needed a few components for his hardware interface because an 8-pin PIC processor took on all the work of converting the azimuth pot and strength signals from analog to digital and streaming them at 9600 baud to the PC (**Photo F**).

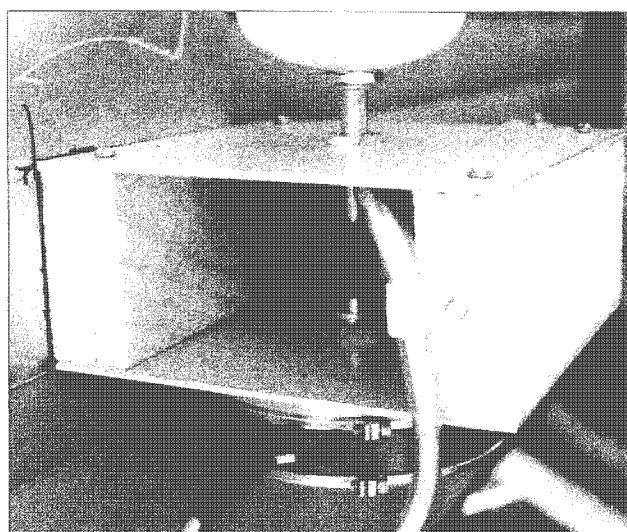
As Brian turns his antenna, the PC paints a polar pattern of signal strength versus azimuth. From the keyboard, he adjusts the persistence of the display — how long the old traces last as new data comes in. When he turns a sharp corner, a touch of the "C" key clears the screen so that new relative-to-car bearing data is displayed without confusion. There are software settings for threshold and gain of the S-meter circuit to match a wide variety of radios.

Not content with Version 1 of the software, K4BRI just completed an upgrade that includes a sonar-like "waterfall" display of bearing history that's very useful in areas of high signal reflections. For those like me who prefer bearings relative to north instead of to the vehicle heading, the new program accepts NMEA serial data from a GPS set. Vehicle course direction is displayed as a small vector in the lower corner of the screen, along with antenna position relative to both the vehicle and to north. GPS sets can't determine a vehicle's orientation while it's stopped, so direction-of-travel data is only updated when vehicle speed is 3 MPH or greater, as determined from the GPS data stream.

Both versions of POLAR.EXE run in

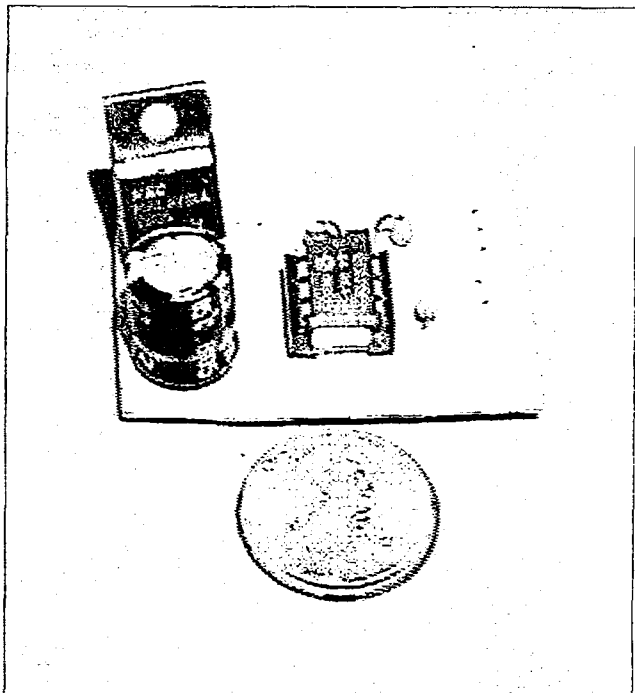


**Photo D.** In this polar display illustration from an actual transmitter hunt, the consistent lobe toward the right shows the correct bearing, while the spikes in other directions are signal reflections. This display belongs to JaMi Smith KK6CU.



**Photo E.** This is how Jerry Boyd WB8WFK of Albuquerque attaches the bottom of his mobile antenna mast to the continuous-turning potentiometer that senses azimuth. The pot must be linear-taper with minimum dead zone. The assembly mounts to the inside of the driver-side door.





**Photo F.** In K4BRI's polar plotting system, a PIC processor and a few other components interface the analog azimuth and strength information to a PC or PDA.

DOS mode under Windows and are available at no cost from Brian's Web site: [<http://www.qsl.net/k4bri/polar.htm>]. You can also download the schematic and construction

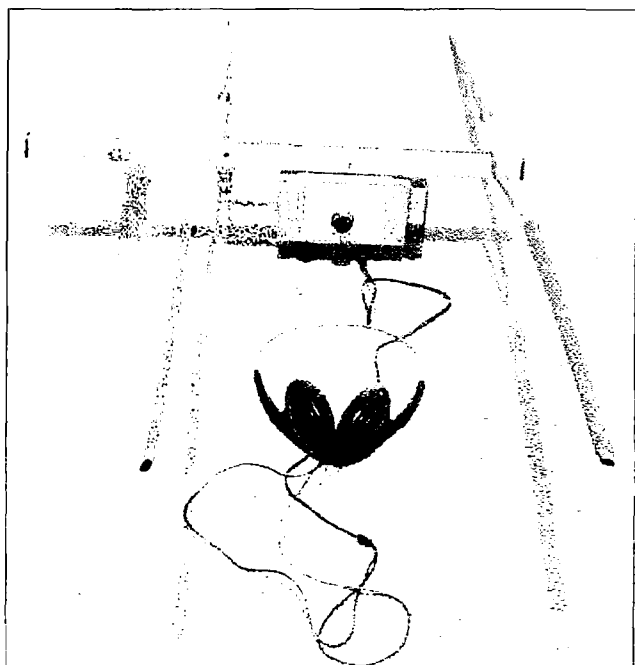
vehicle. But from experience with PocketAPRS, I know that PDAs are difficult to read while driving. If you don't hunt alone, you'll probably prefer to use a

data for his Version 1 interface. Consider sending \$25 to Brian for a PC board and all the interface components, especially if your workshop doesn't have PIC-burning capability.

Did you think I forgot about the PDA display? Brian has an embedded Visual Basic version of the polar program that runs on his Jornada or other Windows CE device. For the details, send E-mail to him at the address on his Web site. The PDA display might be just the ticket if you're T-hunting alone and don't want the hassle of mounting a laptop in your

#### S-Meters and PLLs

Next presenter at the 2002 Hamvention Foxhunt Forum was Marvin Johnston KE6HTS of Santa Barbara, who explained the joys of 80-meter radio-orienteeing. Small rod or loop antennas work very well at 3.5 MHz. With almost no signal reflections from buildings and trees, it's much easier for newcomers, especially young persons, to have rapid success in radio-sports on 80 meters.<sup>7</sup> Marvin turned the



**Photo G.** The Ron Graham potentiometer-tuned ARDF receiver-antenna set for two meters is popular in both the northern and southern hemisphere. K17XF and KK5YY have designed add-on digital tuners for improved performance.

#### WANT TO LEARN CODE?

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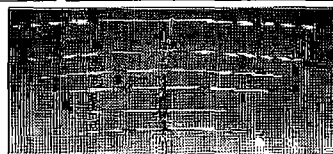
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podium over to Ernie Howard W8EH of Middletown, Ohio, to tell about his modifications to the Icom IC-706 "DC to daylight" mobile transceiver for external S-meter output. Mobile T-hunters need such takeoffs to drive their large dash-mounted meters and polar displays. There are straightforward ways to tap the signals in almost any receiver,<sup>8</sup> but most hams prefer to do this surgery on older rigs that don't have tiny surface-mount components. Ernie showed that it's possible to be bold and take a soldering iron to an in-warranty radio with good results.

Last of the technical presenters was Gerald Schmitt KK5YY of Los Alamos, New Mexico, who described in detail the low-cost PIC-based phased locked loop (PLL) tuner he is perfecting. He thinks it's ideal for ARDF receivers and QRP rigs. KK5YY is the second to devise a PLL tuner

for the Ron Graham two-meter ARDF set from Australia. (The first was Harley Leach KI7XF.)

ARDF sets from Ron Graham VK4BRG<sup>9</sup> are very popular both in the USA and down under, but they are best for single-frequency hunts because they are tuned across the full band with a one-turn potentiometer (Photo G). Adding a PLL makes it much easier to QSY on multiple-frequency hunts. Here's hoping that KK5YY and KI7XF will publish their designs soon.

The next section of the forum covered the latest news of international-style on-foot foxhunting (called ARDF and radio-orienteeing). Bob and Dick reviewed their experiences at the First and Second USA ARDF Championships and at the 2000 ARDF World Championships in China. Then they gave a brief promo for the Third Championships, for which they are Co-chairs. They invited everyone to come to Cincinnati from July 30th through August 3, 2003, for these events.

With help from early announcements, Bob and Dick are sure that they will be welcoming competitors from all over the USA next year, and plenty of foreign visitors too. They were already well into the preparations as WA6EZV gave me an update in early July: "We have four potential sites within 45 minutes of the dormitories. I have official maps for all sites and I've run them all. There's a nature trail a half-mile from the dorms where we can have a practice course. It's already mapped.

"We've already got the dormitories pretty well arranged," Bob continued. "We have six committees listed on the Web site [<http://w3.one.net/~bfrey/>] and we're starting to draft letters to the nearby clubs. One group is investigating medals, pricing and design. Another is designing the T-shirts. A fellow is working with university transportation about buses. We're writing letters to get water and medical supplies."

Shortly after this issue arrives in your mailbox, Bob and Dick will be returning from the 2002 ARDF World Championships in Slovakia, where they are promoting the 2003 USA Championships to radio-orienteeers in two dozen countries. "We arranged for some 2-inch round buttons with the logo and '2003 Region 2 Championships' on them," Bob says. "I also have some T-shirts with the logo on the pockets."

### This hidden T might attack!

To top it all off, the 2002 Dayton Foxhunt Forum concluded with some other ways that hams are using RDF, including tracking of

accidental and deliberate interference, plus wild animal management (not on ham radio frequencies, of course).

As regular readers know, hams across the USA have monitored for tag transmitters on migrating endangered birds. Others, such as Terry Hudson KT9V of Solsberry, Indiana, are volunteer trackers of four-legged animals such as mountain lions.

"One of Terry's bobcats recently strayed out of Indiana and ended up in Mt. Airy Forest about four miles south of me," says WA6EZV. "Terry was out of the area but he knew it was down here. WB4SUV came over and was able to pinpoint its location in the woods. About three days later it was hit by a car."

WA6EZV and WB4SUV are already making plans for the 2003 Dayton Foxhunt Forum. The Hamvention will be May 16th through 18th. More information is at the Dayton Amateur Radio Association Web site [[www.hamvention.org](http://www.hamvention.org)]. But you don't have to go to Dayton to learn about the fun of RDF. There may be a good program on the subject at a club or hamfest near you.

It's too late to invite you to my talk at the ARRL Southwestern Division convention in early August, but there are knowledgeable local experts on RDF all over. If they aren't talking at a nearby hamfest, they will probably be eager to present the topic to your local radio club. Web sites and E-mail contacts for many of them are on the RDF Links page of my "Homing In" Web site. Be sure to send news of your local RDF activities to my electronic or postal mail addresses, listed at the beginning of this article. Happy hunting!

### Footnotes

1. Details in "Homing In" for October and November 1992.
2. Details in "Homing In" for January and February 1993.
3. Details in "Homing In" for November 1993.
4. Details in "Homing In" for March 1994.
5. Details in "Homing In" for April, June and July 2001.
6. Details in "Homing In" for July, August and September 1997.
7. More about 80-meter ARDF is in "Homing In" for November 2000.
8. Details in Chapter 5 of *Transmitter Hunting - Radio Direction Finding Simplified* by Moell and Curlee, published by TAB/McGraw-Hill, ISBN number 007-1560068.
9. Web site [<http://users.mackay.net.au/~ron>].

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# Setting Up a Temporary HF Station

*Last time, we discussed some of the aspects of setting up a HF amateur radio station in an emergency situation. This month, we'll focus on various designs to make actually operating as convenient as possible.*

There are three major things you want to achieve in setting up a radio operating position: access to power, access to the antenna, and access to the people you are supporting. Let's look at each of these in general and see how we can apply them.

### Access to power

A number of the places where we amateurs may be called upon to provide support may already have backup power systems for their own purposes. Hospitals have several redundant layers of power, including multiple power feeds to the building, on-site generators, and some level of battery backup. If you have established a good rapport with your agency, you probably already know where an emergency power outlet is that you can use. Obviously, many of these are already planned for other uses, so we can't assume that we'll get first right of refusal for a particular outlet. In hospitals, most emergency power outlets are identifiable because they are red. The actual outlet itself or both the outlet and the wall plate may be red.

If you are setting up in an area that does not have emergency power capability, you may need to provide your own power. Dragging a deep cycle lead-acid battery up several flights of stairs may not be the ideal approach, especially if you would have to repeat the trip multiple times to recharge the battery. I tend to avoid using elevators when there is a distinct possibility of the power being interrupted, so the stairs become a necessary evil.

One last issue – if you are recharging a lead-acid battery, this is best not done inside, since the recharging process produces hydrogen gas that is highly flammable. A pilot light for a gas stove or gas water heater or other flame, or even a spark, can lead to an explosion.

### Access to the antenna

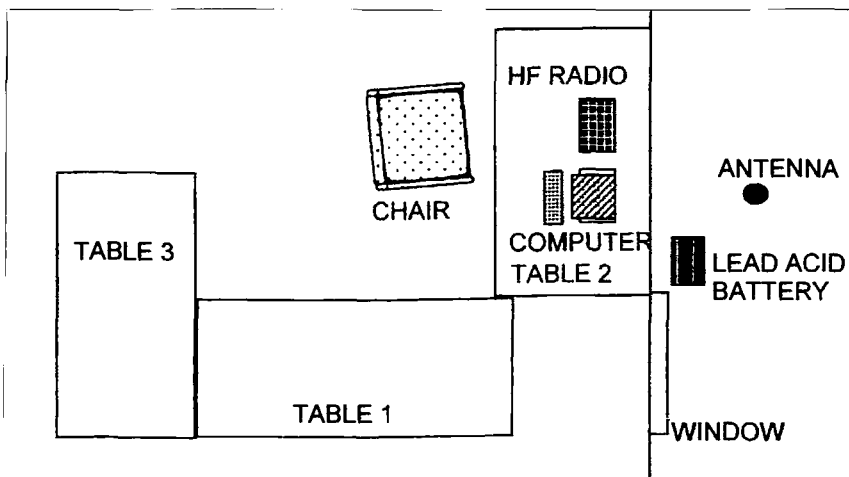
You can get a dynamite signal by constructing an antenna on the top of a tall building, but placing the operating position close to the antenna may mean you are inconveniently separated from those you are supposed to be serving. On the other hand, a ground-mounted antenna may not provide the signal you would like. Once again, the ideal situation is to plan in advance with the site you may be serving. Many hospitals have an identified location for their amateur radio operator with emergency power and a connection to a permanently mounted antenna, at least for VHF. In other cases, the local Red Cross or Salvation Army office may be the planned location for HF coverage and can be fully equipped before a need ever arises. Some have a fully loaded tower with yagi and rotor, as well as various dipoles, long-wires, slopers, etc. This is

ideal, but it is still best to plan on operating under less than such ideal circumstances.

### Access to the people you're supporting

The operating position needs to be located so that people can ask the ham operator to get certain information or send certain information without inconveniencing either.

If you have to set up a station location on short notice, it would be ideal to be near some type of window. This could provide a path for coax leading to the antenna and a lead-acid battery could be located just outside for charging safety. In areas subject to hurricanes, the hurricane shutters provide protection, but may also prevent the routing of cables. In this uncertain day and age, I'd prefer not to be sitting with my back to a window if I were providing communications services to a public service department. I



**Fig. 1.** By being located near the window, cables can be led outside for connection to the antenna, ground, and battery. A yellow "Caution" tape around these items may keep people away from being injured. Tables one and three keep the operator separated from the general population.



would prefer to be near the window but not in line of sight. You never know.

**Fig. 1** shows one possible station layout. I've based this on items readily available in a hospital or school. Tables, such as those found in the cafeteria, provide an operating location as well as a border of sorts. Well-meaning people may not realize that in sub-optimal conditions, a high degree of concentration may be required when operating. The battery and antenna are located just outside the building but easily connected through the window. It may be advantageous to rope off the area to keep people from coming into contact with the antenna. Likewise, the battery may prove a tempting target, so it may be wise to conceal it and/or chain it to something solid.

Some clubs take a whole different approach and set up their station in a van or camper so that it can be taken to where it is needed and put on the air almost immediately. In some cases, the use of a van has an added advantage in that it is managed and or funded via a public service agency or

perhaps the Red Cross. As such, the vehicle is identifiable and known, which often makes it easier to access the location where the station is needed.

**Fig. 2** shows one possible layout for a van. The idea is loosely based on the communication van used by the Brevard Emergency Amateur Radio Service (BEARS) on the east coast of central Florida.

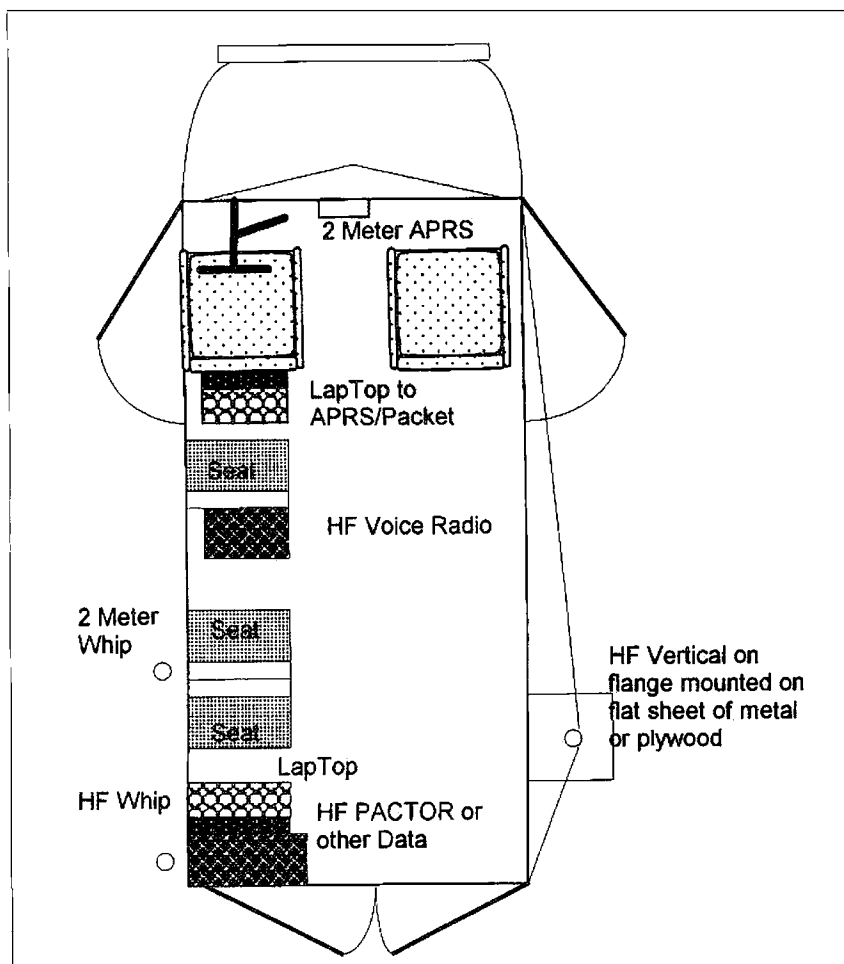
VHF and UHF equipment should be readily accessible to the driver. In an ideal world (one with no budgetary constraints), I'd put something like the Kenwood TMD-100 or Alinco DR 135-TP so that I would have access to 2 meters while driving. I'd also have APRS available using the same rig. There are times, such as during hurricane season, when a mini weather station transmitting data via APRS would be helpful to the National Weather Service. Temperature and humidity sensors could be permanently mounted or all sensors, including a wind direction and speed indicator, field-mounted on site. In a van, radios with detachable control screens may free up more

working space. The actual rig could then be placed under the operator's seat.

I'd mount the other radios along one wall of the van, either in one line, or in a mini cubicle arrangement as shown. This would leave a small but usable aisle along the other side. Of course, with a van I'd love to include a solar array on the roof and a gas- or propane-powered generator that could provide power when needed without running the van engine.

With either design, there are a number of safety issues that need to be addressed. You want to limit access to a certain degree so that the amateur radio operator on duty can concentrate. You also want to make sure that others do not operate the radios without permission. In addition you want to make sure that people cannot inadvertently come into contact with antennas or other connections that could expose someone to high levels of radio frequency exposure or result in an RF burn. As mentioned earlier, any lead-acid storage batteries need to be located in a well-ventilated area. Unlike our ham shacks back home, operating in this environment will expose equipment to many people of all ages who have no understanding of the potential dangers that might exist.

Designing a potential operating location can be a lot of fun and makes a great project. This is one of those activities that can involve both new hams and experienced ones, with both groups being able to contribute. Let me know what ideas you and your public service team may have with regard to the ideal operating location. 73



**Fig. 2.** The trick with a van is to coordinate space for operations while allowing passage from one position to the next.

## Amplifier Testbench Report

*continued from page 17*

equal plus and minus voltage power supplies. Most op amps, however, don't have a "ground" terminal, and it isn't difficult to use a single supply voltage. In this case, the noninverting (+) input pin needs to be held at a voltage equal to halfway between the supply voltage and ground. R5 and R6 are a simple voltage divider to provide  $V_{cc}/2$  bias to pin 3. C2 keeps the DC off T1 and also prevents R8 from loading down the voltage divider. (The input resistance of the CLC400's noninverting input exceeds 200k ohms, so its current doesn't significantly alter the voltage division ratio of R5 and R6.) Since we are using a single power supply, a DC voltage of  $V_{cc}/2$  appears on the output pin and is blocked by C1.



I hope that readers will feel free to contact me with any questions. **73**

## FAIRS in Dominica

*continued from page 39*

other. We heard Australia and the U.S.A., and even talked to an amateur in Vancouver BC on the IRLP. It certainly is an exciting use of the Internet and amateur radio. Look at the Web site [www.IRLP.net] for more information about how to build and use an IRLP link.

Our hosts, Clement and Hetty Pierre Louis, J73CPL and J73HPL, live in a beautiful home in Wotten Waven — a community of about 280 people. It is located at 900 feet in elevation and 4 miles from Roseau on the west or Caribbean side of the island. Clement has a small farm with many varieties of tropical fruits and vegetables. The view from their home of the lush green mountains is really spectacular. Sleeping up on the mountain with no sounds except the cool air and forest sounds was really nice. Hetty treated us to great Dominican meals — much of the ingredients for which were grown on their own farm. We really can't say in words how much we enjoyed visiting and staying with Clement and Hetty, but it was so relaxing and enjoyable — they were really just great to us!!

Our HF radio operation took place at the station located in the home of Clement and Hetty Pierre Louis. Don J79UGF and Dave J79WW helped Clement and Hetty set up the station in 2000. The station consists of a two-element triband beam up 30 feet on a pole. The beam also has a single element on 12 and 17 meters. For 40 and 80, a G5RV is used. Their home is at a wonderful location for ham operations. It is also near the end of the power line and a very quiet location with almost no local RF noise — the S-meter does not show any noise! The equipment is an Alinco DX 70 HT HF transceiver with an Ameritron 500 watt solid state amplifier and MFJ antenna tuner. The four of us made over 3,000 contacts in our limited "spare" time during the 10-day stay. We were surprised to work so

many QRP SSB stations, many with only 1 or 2 watts.

Clement has been busy constructing a guest house behind his home. It should be completed by April. It will have three bedrooms, two baths, and kitchen, and if you rent it you can use the antennas we used during our visit. It puts out a mighty strong signal, as indicated by the contacts we made all over the world. A tower and beam are in the works to be installed at the guest house. However, the present antennas are very good.

Contact Hetty J73HPL for more information on their amateur radio guest house. Whether you come by cruise ship or fly into Melville Hall from connections in San Juan, Puerto Rico, you can rent a car and spend time touring the beautiful corners of this small island (15 by 30 miles). There are also several diving and snorkeling establishments that would be happy to have your business.

Please look up the FAIRS Web site [www.fairs.org] for more information about the activities of FAIRS, and the Dominica project. **73**

## CALENDAR EVENTS

*continued from page 41*

fairgrounds. From I-77 S, take 4th St. NW exit, turn right (W) into grounds. Setup at 6 a.m. Admission \$5, under 12 free; 8 ft. tables with electricity \$12. Handicap accessible. Indoors and heated. Free parking. Talk-in on 147.18(+). Tables contact is Terry Russ N8ATZ, 3420 Briardale CR. NW, Massillon OH 44646. Visit the Club Web site at [www.qsl.net/w8np]. There will be an auction at 10 a.m. 15% commission charged on all items sold. You may buy back your own items at no charge.

**WESTMINSTER, MD** The Carroll County ARC will hold its 13th Annual Mason-Dixon Computer & Hamfest 8 a.m. to 3 p.m. at the AG Center in Westminster MD. Vendor setup begins at 6 a.m. VE exams begin promptly at 9 a.m. Great food, and free radio checks. For more info visit [www.qis.net/~k3pzn]. E-mail [k3pzn@qis.net]; or write CCARC, P.O. Box 2211, Westminster MD 21158. Donation \$5, children under 12 free. Tailgate space \$5 per 12 ft. space. Vendor and tailgating setup 6 a.m. General admission 8 a.m. 8 ft. tables inside. \$12 per table, every 4th table free. Tables guaranteed only if reserved by Oct. 5th with full payment. No pay, no reservation. Mail to Mason-Dixon Computer & Hamfest, P.O. Box

2211, Westminster MD 21158. MD State law requires vendors to collect Sales tax. E-mail [k3pzn@qis.net]. VE exams, pre-registration required. Contact Phil Karras KE3FL, 3305 Hampton Ct., Mt. Airy MD 21771. Phone 301-831-5073; E-mail [ke3fl@juno.com]. Testing will be conducted on the hamfest premises. On-site exam check-in begins promptly at 9 a.m. No admittance to exam room after 10 a.m. Required for VE exam: original FCC license plus one copy, two forms of ID, one with photo; any CSCEs; exam fee, \$10 cash only.

## CALENDAR EVENTS, ETC.

**SEP 6, 7, 8**

**PLATTEVILLE, WI** The Hidden Valleys ARC will have a special event station "W9D" (Wisconsin 9 Dairy). This station is for the 55th Annual Dairy Days in Platteville WI. Around 2500 kids are expected to be there through the weekend. We will be operating during daytime hours Friday, Saturday, and Sunday, on 80-6 meters SSB and CW; also 2-meter FM. Certificate/QSL available on request. Please send with an SASE. Write to HVARC, P.O. Box 112, Platteville WI 53818. If you have any questions please E-mail to [kb9ryi@arrl.net].

**SEP 7 & 8**

**NORWICH, CT** The Radio Amateur Society of Norwich (RASON), will celebrate the activation of the New London Ledge Lighthouse (#USA-542), by operating a Special Event Station on CW, Phone and RTTY in the General portions of the HF bands. QSL to RASON, P.O. Box 329, Norwich CT 06360. For up-to-date info, see [www.rason.org]. **73**

## THE DIGITAL PORT

*continued from page 47*

I found it has a crop tool which works like a whiz. You do have to exercise a little caution when cropping to keep the perspective. But if you miss and get something out of proportion, the OOPS!! Feature will let you get as many stabs as you need to get it right.

Also, when you click the "Sunny" icon next to the OOPS!! button, you will find you can adjust brightness, contrast and gamma to get your image to look just the way you think it should. And if you are really adventurous, the program extends the possibility of drawing freehand along with inserting objects from the "Things" pull-down.

The idea of the software is to give the ham the at-the-fingertips flexibility to take an

*Continued on page 61*



## Skip, Skip, Skipping Along

*Solar activity will decrease to low or moderate levels this month with a few isolated CME's and M-class flares thrown into the mix. No extraordinary events are foreseen, and in fact only one day is forecast to be Poor (P) at all latitudes! Only 7 other days are listed as Fair-to-Poor (FP) so you might say that things are looking up for HF operators. While this is certainly good news, don't get too excited because coronal hole effects will limit most of the bands to Fair (F) conditions most of the time.*

As mentioned in my last column, non-polar coronal holes are a prominent feature of post-peak solar behavior and each one can exist for months or even years. They are going to be with us more often than not through the back end of Cycle 23 and will prevent DXers from enjoying many long stretches of good propagation. If the current holes persist (this being written in early July) then we can expect the first half of September to be mediocre at best. The 16th-18th and 22nd-27th will provide some Good (G) DX'ing conditions however, and I've even included two Very Good (VG) days within those intervals.

For seasonal effects, we can expect storms in the Atlantic and Caribbean to disrupt the lower frequencies (upper bands) since September is at the heart of hurricane season. To counter-balance this, the lengthening hours of darkness will provide more opportunities on 40 to 160 meters should there be any periods free of tropical activity. Also, given the declining sun angle, 10 and 15 meters should be open longer as the MUF's (maximum usable frequencies) continue to increase. As is most often the case for early autumn, most activity will be concentrated on 15, 17, and 20 meters, but the other bands should begin to pick up as time passes. All in all, September will not meet seasonal expectations, but will be a long shot better than what we experienced during most of the summer. Until next time, 73!

### Band-by-band summary

#### 10 and 12 meters

Conditions will improve throughout the month and all parts of

September 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
1 F	2 F-G	3 F	4 F	5 F-G	6 F	7 F-P
8 F-G	9 F-G	10 F	11 F-P	12 F	13 F	14 F-P
15 F	16 G	17 VG	18 F-G	19 F-P	20 F-P	21 F-P
22 F-G	23 G	24 G	25 VG	26 F-G	27 F-G	28 F
29 F	30 P	31 F-P				

EASTERN UNITED STATES TO:																
GMT	00	02	04	06	08	10	12	14	16	18	20	22				
Central America	15/17	17/20	17/20	17/20	17/20	15/17	15/17	10/12	10/12	10/12	17/20	10/12				
South America	15/17	15/17	20	30/40	30/40			10/12			12/15	12/15				
Europe	30/40	30/40	17/20	17/20				10/12	10/12	12/15	17/20	17/20				
South Africa	20/30	40	20/30	20/30					10/12	10/12	12/15	12/15				
Eastern Europe	17/20	30/40	40/80	40/80	30/40			15/17	10/12	15/17	15/17	17/20				
Middle East	20	20	20						10/12	10/17	15/17	15/20				
India/Pakistan	17/20	17/20						15/17								
Far East	10/12		17/20				17/20	17/20			15/17	10/12				
Japan	15/17		17/20	17/20			17/20	15/17	10/12			15/17				
Southeast Asia	10/12	17/20	20	20	30/40	30/40	17/20					10/12				
Australia	10/12	20	20	20	30/40	30/40	17/20				15/17	10/12				
Alaska	10/12	12/15	17/20	17/20	20/30	20/30	17/20	17/20			10/12	10/12				
Hawaii	10/12	12/15	17/20	17/20	20/30	20/30	17/20	17/20			10/12	10/12				
Western USA	20/30	20/30	20/30	30/40	30/40				10/12	10/12	10/12	15/17	17/20			

CENTRAL UNITED STATES TO:																
GMT	00	02	04	06	08	10	12	14	16	18	20	22				
Central America	15/17	15/17	17/20	17/20	20/30			10/12	15/17	10/12	10/12	10/12				
South America	15/17	15/17	20/30	20/30	17/20			10/12			10/12	12/15				
Europe								12/15	12/15	12/15	17/20	17/20				
South Africa			17/20	17/20					12/15	12/15	15/17	17/20				
Eastern Europe	30/40	30/40	30/40						12/15	12/15	17/20	17/20				
Middle East	20	20							15/17	15/17	15/17					
India/Pakistan	15/17	17/20						12/15	12/15							
Far East	10/12	12/15	17/20	17/20	17/20		17/20	17/20				10/12				
Japan	10/12		15/20	17/20					10/12	10/12						
Southeast Asia	10/12	15/17	15/17		17/20	20/30	30/40	17/20			12/15	10/12				
Australia	10/12	12/15	17/20	17/20	20		17/20	17/20			10/12	12/15				
Alaska	12/15	15/17	17/20	17/20	20/30	20/30	30/40	17/20			10/12	12/15				
Hawaii	12/15	15/17	17/20	17/20	20/30	20/30	30/40	17/20			10/12	12/15				

WESTERN UNITED STATES TO:																
GMT	00	02	04	06	08	10	12	14	16	18	20	22				
Central America	10/12	12/15	15/17	17/20	30/40				10/12	10/12	10/12	12/15				
South America	10/12	12/15	15/17	17/20	17/20						10/12	10/12				
Europe	17/20				17/20			17/20	17/20	20	20	20				
South Africa	17/20	20		20						10/12	12/15	12/15				
Eastern Europe	17/20	17/20							15/17	15/17	17/20	17/20				
Middle East	20									15/17	15/17	20				
India/Pakistan		15/17	17/20						12/15	15/17						
Far East	10/12	10/12	12/15	17/20	17/20	17/20			17/20			15/17				
Japan	10/12	10/12						17/20	15/17	17/20						
Southeast Asia	10/12	12/15	15/17	15/17	17/20	17/20	17/20		17/20							
Australia	10/12	12/15	15/17	15/17	17/20	17/20	17/20		17/20							
Alaska	10/12	10/12	15/17	17/20	17/20	17/20	17/20		17/20	17/20						
Hawaii	10/12	10/12	12/15	15/17	20/30	20/30	30/40			12/15	10/12					
Western USA	20/30	20/30	30/40	30/40	30/40				10/12	12/15	12/15	15/17	17/20			

**Table 1.** Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



the globe should eventually become workable during daylight hours. In general, work from east to west as the day progresses, but expect southeasterly through southwesterly paths to be better than those near the auroral zone. For folks hunting exotic contacts, try morning and evening gray-line paths over the poles and listen for polar echo as an aid to identifying signals coming from Asia. Daytime short-skip will normally be somewhere between 1,000 and 2,000 miles.

### 15 and 17 meters

Openings will be longer than those on 10 and 12 meters, and signal strengths will continue to improve as the month passes. Long-path propagation should be particularly good so look for interesting opportunities to Asia and the Far East at the times shown on the band-time-region chart. However, the best openings will still be to Central and South America, especially from early afternoon through mid-evening. Phenomenal skip up to 2,400 miles is possible on these bands on Good (G) days, but the average will usually be from 1,000 to 2,000 miles.

### 20 meters

"Twenty" will be your mainstay as usual and can be worked around the clock, but nighttime will provide the strongest signals. Try long-path propagation across the Arctic for forays into Asia and the Far East, and look for strong short-path propagation to Australia, Indonesia, and the South Pacific. Short skip could be as limited as 500 miles during the day but will normally be from 1,000 up to 2,200 miles at night.

### 30 and 40 meters

Hurricane season will continue to make life difficult here, but during quiet periods there should be some great DXing opportunities between sunset and sunrise. Central and South America will be your mainstays of course, but Eastern Europe, Africa, and the Middle-East could provide some interesting variety, especially for those east of the rocky mountains. Skip will vary between 800 and 2,000 miles at night but expect only 600 to 800 miles during the day.

### 80 and 160 meters

Check these bands when 40 meters comes alive. Although tropical activity will still curtail activity here, continental nocturnal thunderstorms will no longer be as much of a problem as they were during the summer months. Look for peaks just after midnight

and again just before sunrise, a situation that pleases both night-owls and early risers. Short-skip will normally vary between 900 and 2,000 miles. 73

## THE DIGITAL PORT

*continued from page 59*

image and make it ready to send over the air quickly using ham recognizable symbols and phrases. It was written for this specific purpose and does the trick with much less effort than software aimed at the commercial graphics artist.

### Out into the airwaves

Once you get the hang of handling your image files and editing and saving them, you will quickly amass a library of images you can share with hams over the air. The final piece of the puzzle is to get the image into a communications program so you can get on the air and play.

You will find in the SSTV-PAL program setup a provision to work with a number of different programs. I don't think I have found a bad SSTV program. They all work. The program I recommend to "get your feet wet" is MMSSTV.

Once you have chosen the communication software (in this case, MMSSTV) you wish SSTV-PAL to send images to, and you have an image displayed in the SSTV-PAL window, you need only click the box that says "send to MMSSTV." The image will magically appear in the MMSSTV display and you are ready to transmit it or save it to the "stock" folder in MMSSTV.

How do you save the images to the stock folder in MMSSTV? Just click on the image, hold the left mouse button down, drag it to one of the little panes below the regular program, and release the button. It is saved. You can check on it with your Explore tool. It will take on an assigned name such as TXStock1 and may not be in the format you expect, but it will be saved and come up when you open the program; and be available to drag in ready for transmit when you feel the urge.

So much for the quick lesson in file handling and use of two super pieces of freeware available to the ham to realize his image fix. As I mentioned, there are other programs available for SSTV. The accepted standard is ChromaPix. It is a commercial piece with a worth-the-price fee. I recommended these other two programs because they can get you going for pennies. If you like what you get into, then is the time to make choices to make a proper investment.

## Other items

I mentioned the WinLink2000 network earlier. I had a few complaints the last time I reviewed the use of that system. During the recent time when an aficionado of that group visited, I downloaded the later version 3 of the AirMail software and my PK-232MBX worked flawlessly to connect via Pactor to the system to exchange a few messages. This was a great improvement.

I am not sure what made the improvement. My first thought was it must be the new and improved software, and that may be true. However, I believe I installed the DSP filter chips in the 232 in the time elapsed between tests. So that may have had an effect as well. Whatever the case, it is possible for a user with only Pactor I to exchange short messages over the system without going to the expense of the more sophisticated equipment running the Pactor II. For what it is worth, I was satisfied. The difference is speed. Pactor I can be dramatically slow by comparison and long messages would be a real pain.

Last month I mentioned getting a board with more serial ports to make life easier and take advantage of some of the toys that really need more than one port on the computer. Well, two things. First, I was gone a lot of last month. Second, I ordered wrong and the board had to go back for exchange.

Hopefully, I will have that little project together by next month and can tell illustrious stories of toys all working so well that I will hold you spellbound for hours. Really, the problem with the modern computers is they are being designed to plug the "other" toys in rather than the stuff you and I use.

That is, the digital camera has a USB port I can plug into on the front of this computer. When I go to plug in my radio control module or the PK-232MBX, or simply a PTT circuit, the single 9 pin serial port on the back of the computer is situated so that I have to plug in a handful of adapters and prop them in place so they don't fall on the floor. Somebody's a plottin' to get us guys. I'll see what I can do for an answer.

### And what about *The Chart*?

As I mentioned last month, *The Chart* has vanished from 73. I have started a Web site at [<http://kb7no.home.att.net/>]. I hope to load that up with info you can use along with an updated version of *The Chart*. There is an advantage to the Web site for you since you can get the URLs you want and click on them instead of the tedious typing method.

That's it for this month. Thanks for all the kind words via the E-mail. Glad to help where I can. [KB7NO@worldnet.att.net] 73



## HAMSATS

continued from page 52

enthusiasts within range of their transmitted uplink signal.

The receivers on AO-7 are quite sensitive. Amplifiers are not necessary, but only cause "FMing" of the transponder. That's the chirp on the CW and the warbling on the SSB signals. Don't use FM or any other continuous-duty uplink signals.

Back to the future, or forward to the past? It's time to enjoy a piece of history firsthand. The designers and builders of AO-7 are to be congratulated on an incredible job well done. There aren't many 27-year-old satellites still providing active service from orbit, and this one was built by hams with passion.

AMSAT OSCAR-7 — on the air again!

## LETTERS

continued from page 8

fireman would be required to know what the ECS is, what skills an ECS member possesses, what areas an ECS member should have access to to provide their service, and knowledge of what an ECS I.D. is.

You are correct in that we don't need to reinvent the wheel. Someone (the ARRL?) needs to say to the appropriate people or agency, "Yes, it is a good idea. We have 50% of what is proposed already within the amateur radio community. Let's figure out what else we need (additional national-based training) and, most important, how we get the ECS to be a required part of local public safety agencies' disaster plans."

As a secondary benefit of the increased awareness of amateur radio's capabilities, maybe the "antenna problem" would receive more positive consideration from local governments.

I would be interested in any comments you have.

*Our comment is that we would like to hear how other readers feel about this. Thanks, Robert.—J.B.*

**Ben Alabastro W1VM, Rutland VT.**  
Dear Mr. Burnett, I roared with laughter after reading your "sulfuric acid" remarks about Bill Pasternak WA6ITF's flamboyant comments about the ... er ... resurrection of 73 Magazine by Wayne. Ah, yes, creativity is alive and well!

I have been subscribing and reading 73 for years. To me, 73 Magazine is on the cutting edge of amateur radio. Best of 73!

*And same to you, Ben, along with thanks for the kudos. Been called a lot of things in my life, as the saying goes, but can't say that "sulfuric acid" is one of them. Lots of great folks in the Rutland area, 73 to all. —J.B.*

## QRX

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thinks that some people are. It also believes that the FCC should not allow certain RF telemetry equipment in health care facilities. The Taskforce holds the opinion that these RF fields will have what it calls the "unwanted, illegal, and unconstitutional effect of depriving electrically sensitive persons of access to health care."

Well, it turns out that the electrosensitivity issue was considered by the FCC some time ago in Docket 95-177. After the matter was given consideration, it was dismissed. More information can be found at [[http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-02-135A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-02-135A1.doc)].

Thanks to the FCC, via Newsline, Bill Pasternak WA6ITF, editor.

## Atomic Coffeemaker

If you are a ham who has trouble waking up to keep those wee-hours DX schedules, the answer may be as close as the local appliance store. How about an atomic time coffee maker?

No, we aren't kidding. We discovered this one in an appliance store in the Ft. Lauderdale, Florida, area. It's called the Perfect Time Coffeemaker, and, according to its manufacturer, Melitta Salton, Inc., it's the first such device using radio frequency reception of atomic clock signals to keep it in sync with the National Bureau of Standards timekeeping system.

Melitta Salton claims that the internal clock provides accurate time right out of the box by monitoring the WWVB broadcasts from Boulder, Colorado. All the user need do is to select his or her time zone and the coffeemaker does the rest. It even automatically adjusts to Daylight Savings Time, and its internal backup batteries keep it going during short duration power losses. Salton also says that it also brews good coffee. And what more could any DX hound ever ask for?

Thanks to Newsline, Bill Pasternak WA6ITF, editor.

## Vocabulary Lesson

**Arbitrator** [ar'-bi-tray-ter]: Cook who leaves Arby's to work at McDonald's.

**Avoidable** [uh-voy'-duh-buhl]: What a bull-fighter tries to do.

**Rubberneck** [rub'-er-nek]: What you do to relax your wife.

**Subdued** [sub-dood']: Like a guy that works on one of those, like, submarines, man.

Thanks to the Penn Wireless Association's X-MITTER, July 2000.

## NEVER SAY DIE

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the government. So what's improved as a result of all this taxation?

Today, because mothers are forced to work, 64% of the three top five-year-olds are stored in day care centers. A recent study showed that 70% of these provide mediocre to simply awful care.

With less than half the states having any minimum requirements for child-care centers, and with employees often making less than parking lot attendants, there's an annual 30% turnover rate.

The result is that our children are being given a minimum of help and exposure to new ideas and experiences at the critical time of their lives when their brains are wide open for development. This is a loss of brain growth that can never again be regained.

This is a time when children could be learning a dozen languages, listening to all kinds of music, learning to use their hands creatively by drawing and using clay. When they could be learning to play an instrument. All of these things build skills and increase IQs.

How did we let ourselves get into this mess? By being kept entranced with watching TV and sports. We know about Tiger Woods, ball and hockey players, but we're totally ignorant about how the money the feds and our states take out of our pocket is being spent.

Oh, we see endless TV exposés of government waste and corruption, but we never translate that into enough personal concern to do anything about it. Our political parties are organized and we aren't, so we're just sheep to be shorn.

Step one: Get mad. Step two: Don't ever donate to any candidate's re-election fund. Step three: Never vote to re-elect anyone (NRA).

## Carping

I'm constantly carping about the government education monopoly, another black hole for our tax money. According to the National Center for Educational Statistics, we're coughing up an average of \$7,000 per government school pupil per year. That's twice the average for private schools. In some areas, such as Washington, D.C., they're spending an average of \$9,000 per student.

Laura Schlessinger now says that government schools are beyond reform and need to be abandoned. Well, as Michael Medved says, "The government makes a mess of everything it does." And we're paying the tab.

Sending one's kids to a public school

Continued on page 64



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Blood Purifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! \$10 (#01)

**Plant Growth Stimulator:** This has the same circuit as the above, all ready to use. Postpaid: \$155 (#PGS1)

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life

aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the *Drum*. \$5 (#10)

**Travel Diaries:** You can travel amazingly inexpensively — once you know the ropes. Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under \$1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. \$5 (#11)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. Yes, of course we pay for your articles! \$0 (#78)

**Wayne's Caribbean Adventures:** My super budget travel stories — where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

No, I'm not a nut case.  
**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngsters' IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gottschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. As an iconoclast I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 100 Editorial Essays:** \$5 (#72)

**1997 157 Editorial Essays:** \$8 (#74)

**1998 192 Editorial Essays:** \$10 (#75)

**1999 165 Editorial Essays:** \$8 (#76)

**2000 101 Editorial Essays:** \$5 (#77)

**2001 104 Editorial Essays:** \$5 (#78)

**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Colloid Reprint.** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Clips.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)

**Silver Colloid Kit:** \$25 (#80-98-99)

**Four Small Booklets Combined:** Dowsing: why and how it works; Super Organic Food: a trillion dollar new industry; Schools in 2020: another \$ trillion industry; Anthrax, a simple cure. \$3 (#86)

**Stuff I didn't write, but you need:**

**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs — such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax — a capping blow for René's skeptics. \$25 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon and wondered at their weird gate. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of give ways that the photos and films had to have been faked. With our gov't it seems to be just one cover-up after another. \$40 (#93)

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The 73 Flea Market, Barter 'n' Buy, costs you peanuts (almost) — comes to 35 cents a word for individual (noncommercial!) ads and \$1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

**Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls.** The deadline for the November 2002 classified ad section is September 10, 2002.

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## NEVER SAY DIE

*continued from page 62*

these days should be classed as cruel and unusual punishment.

A few years ago they did a program about Erasmus Hall High School, my old school in Brooklyn. What was a beautiful and pretty good 150-year-old school back in the 1930s, when I went there, with 120 afterschool clubs we could join, had been turned into one of the most dangerous schools in the city. I loved singing in the Choral Club, where we did radio performances. And the Savoyards, where we put on Gilbert and Sullivan operettas for the 10,000 students.

And the Radio Club (W2ANU), which helped get me licensed. And the Camera Club, which had me spending many hours a week in a darkroom developing and enlarging photos. And the Book Club.

And so on.

All eventually pffft.

Hey, it's your money the politicians you've elected are spending on this baloney.



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# 73 Amateur Radio Today

IF Test Box

Mobile Repeater

Inside the Kit Biz

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## QRX . . .

### Use the Correct E-mail Address

A couple from Minneapolis decided to go to Florida to thaw out during one icy winter. Since they both worked, it was decided that the husband would go first, while his wife would follow him in a day or two. Once in Florida, the husband decided to send his wife back in Minneapolis an E-mail via his laptop. He accidentally left off one letter in her E-mail and sent the note without correcting it.

A Houston TX widow had just returned from her husband's funeral. He was a minister and a heart attack had called him to Glory land. Upon arriving home she checked her E-mail, expecting messages from friends and relatives. Upon reading her first message, she fainted and fell to the floor. Her son rushed to his mother and saw the computer screen, which read:

To: My loving wife  
From: Your departed husband  
Subject: I've arrived

*Continued on page 6*

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## Wise Up & Beat the Odds

### NEVER SAY DIE

Wayne Green W2NSD/1

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Uh-Oh!

Hmm, the pieces of the puzzle are coming together, and the picture doesn't look good. Yeah, I know that Y2K deal fizzled, as did the 5/5/2000 planetary alignment alarm, so therefore there's probably no reason why you should worry about this Planet X ado.

Those of you who have not been drinking Coke from aluminum cans and thus gradually giving yourself Alzheimer's ... which, incidentally, was unknown a hundred years ago ... may recall my essay about Nostradamus predicting that the Earth's poles would be shifting around 2003 with the accompanying loss of about 97% of human life. This dire prediction was seconded by a similar Edgar Cayce prediction, plus another from well-known prophet Gordon Michael Scallion K1BWC. It's also rather close to the Inca calendar end in 2012. So maybe the Incas were off by nine years.

Charles Hapgood has also predicted a coming pole shift for Earth, something that seems to have been happening every 3,630 years. Einstein agreed with him on this. If you haven't read his *Maps of the Ancient Sea Kings*, you've missed something. He's a well-known and respected historian.

Then there's Zacharia Sitchin, an even better-known and respected historian, and his book about Nibiru, the name the Sumerians gave the 10th planet, which passes by Earth periodically and wipes the slate almost clean.

This has to do with the disappearance of Atlantis, Noah's flood, and other such mischief.

I got word of Planet X when I heard Mark Hazelwood on the Art Bell Show promoting his book, *Blindsided*. I tried for weeks to get a copy from Barnes and Noble. No good. Then Richard Mucci, who has a TV show in Pahrump NV and will be interviewing me for his show, sent me a copy. He'd had Mark on his show.

Okay, what would you do as a world leader if you got word that a huge disaster was coming that is expected to wipe out over 90% of your people? Would you let the media scare the hell out of everyone, totally destroying the country's financial and business structure? Or would you do everything possible to keep the news quiet?

Now, this Planet X has been spotted by several observatories. It's estimated to be about five times the size of Earth and have over a hundred times Earth's mass. It's a brown dwarf star which is moving between our sun and a dead star 50 million miles out, passing through our solar system every 3,630 years. Its mass has already been affecting the sun as well as Earth, giving us a huge increase in volcanic activity, weird weather, skewing our magnetic field, melting glaciers and ice packs. The sun has had the strangest sunspot activity in history, with huge flares arcing out into space ... fortunately, not in our direction. So far.

René discusses past pole shifts in his *Last Skeptic of*

*Science*, citing the discovery of many mammoths frozen almost instantly, with tropical flowers still in their mouths. The shift could take just a few hours, throwing up mile-high waves which would wipe out all coastal cities. Ooops, there goes New York, Washington, all of Florida, Los Angeles, Tokyo, and so on around the world. There also goes all energy sources, probably for years. And all financial institutions. Money would be worthless. And there are those mountains of animal bones piled up around Alaska and Siberia, all killed by a long-ago massive wave.

The Earth's atmosphere would turn black from the erupting volcanoes, maybe for years, making it impossible to grow food.

When's Planet X due to pass between the Earth and the sun? May 2003, according to Hazelwood.

Oh, I almost forgot: Tree ring data also targets a growth stoppage for several years 3,630 years ago.

Two years ago Reuters released this news item: "Russia's Parliamentary leaders and President Putin agreed Wednesday to embark on a three-year crash course to thwart what they said was an anticipated chain of disasters due to hit the country in 2003. 'These are issues of extraordinary importance, strategic issues which may degenerate into a serious threat for the existence — I want to stress this — for the existence of Russia,' former Prime Minister Yevgeny Primakov told reporters." They're expecting

a "massive population shrinkage."

So what could they be expecting might do that?

There's an interesting picture dated 1628 B.C. in *Discovering Archeology* of something larger than the sun passing over a town, with buildings falling down and people running around screaming. That's about 3,630 years ago, and it's a report on a world-wide catastrophe.

Well, we know there have been sudden pole shifts in the past, and that they caused massive extinctions. We just didn't know what was causing them.

How real is all this? Hazelwood makes a darned good case. Get a copy of the book and see what you think.

In the meanwhile, if you and your family are interested in trying to survive, it might be prudent to spend some time on preparation. You'll want to be on fairly high ground, back from the oceans, but not in the mountains, which could get pushed up or down as the tectonic plates suddenly get shuffled around.

Since money won't have any value, start thinking in terms of what would have value for swapping. You'll sure want to have a good working ham station, complete with emergency power ... maybe powered by wind or a bicycle, since gas and electricity aren't going to be available ... probably for years.

Or you can chalk the whole business up to Wayne being gullible.

Continued on page 59



*continued from page 1*

I've just arrived and have been checked in. I see that everything has been prepared for your arrival tomorrow. Looking forward to seeing you then! Hope your journey is as uneventful as mine was.

P.S. It sure is hot down here!

*Thanks to The Tuned Circuit, via The Modulator, June 2002, Fort Myers (FL) ARC.*

## Remember These?

Around the curve  
The car was whizzed  
The fault was hers  
The funeral, hizzzen!  
\*\*\*\*BURMA SHAVE\*\*\*\*

*Thanks to the June 2002 Modulator.*

## An Ode (Get It?) to a Tube

Your anode glows red, your cathode stays blue.  
The greater your output, the brighter your hue.  
Old friends, you and I, my trusty glass bottle;  
You never once failed me when I pushed you full-throttle.

You bagged rare ones in pileups, each new one a thrill,

And lowered each winter's big heating oil bill.  
With no filament delays — just instant, huge power —

I pity that aluminum on top of the tower!  
You've such power out it keeps blowing the meter  
(and the last time I tuned you, you burned up my feeder).

Your case was so hot the paint's all in blisters.  
God bless vacuum tubes, just try this with transistors.

The bands are improving, there's "DXcitement" in store;

So hang in there Ol' Friend, for just one cycle more.

*Thanks to Jim KF7E, Dick AF8X, and The Tuned Circuit, via the June 2002 Modulator, the news and views of the Fort Myers (FL) ARC, Inc.*

## Personal Ad

The following appeared in a newspaper ...

"SBF (single, black female) seeks male companionship. Age and ethnicity unimportant. I'm a young, svelte, good-looking girl who loves to play. I love long walks, riding in your pickup, hunting, camping, fishing. I love cozy winter nights spent lying by the fire. Candlelight dinners will have me eating out of your hand. Rub me the right way and watch me respond. I'll be at the front door when you get home from work wearing only what nature gave me. Kiss me and I'm yours. Call 555-xxxx and ask for Daisy."

The number was for a Humane Society, and Daisy was an 8-week-old black Labrador retriever. They got 643 calls in two days.

*Thanks to The Modulator, June 2002, the news and views of the Fort Myers (FL) ARC, Inc.*

## Young Ham of the Year 2002

Josh Abramowicz KB3GWY, of Reading, Pennsylvania, has been named the *Newsline* "Young Ham of the Year" for 2002. Josh is being honored for promoting amateur radio to young people through scouting programs. Amateur radio and scouting have always had a close relationship, with many of today's most successful scientists, engineers and professionals beginning their careers as both scouts and radio amateurs. This year, that relationship once again shines as the Amateur Radio Newsline, Inc.<sup>TM</sup>, names the 17-year-old Eagle Scout as its "Young Ham of the Year" (YHOTY) award recipient.

According to ham radio operator and Award Administrator Bill Pasternak WA6ITF, Josh Abramowicz was chosen for this award by the Judging Committee based on his work in promoting amateur radio to other youngsters through the Boy Scouts of America. Abramowicz holds a General Class license and will be entering his senior year at Central Catholic High School in Reading, Pennsylvania, this fall. Josh says he became interested in ham radio because of his parents — he's part of a "ham family" — and the Boy Scouts. Josh's father, Mark, is NT3V and a News Reporter/Anchorman at KYW Radio in Philadelphia. His mother, Suzanna, holds the callsign N23G and is a retired teacher. Both hold Extra class licenses. He has three siblings: Amy who is 15 and studying for her amateur radio license, and two younger brothers — Jonathan, age 4, and Jordan, age 2.

Through his family, Josh had been exposed to amateur radio for many years, but it was not until he received an offer to serve on the K2BSA special event station staff at the Boy Scouts' National Jamboree at Fort A.P. Hill, VA., that the ham radio spark was fully ignited. To serve, Josh needed to be a licensed radio amateur. He quickly earned his Technician class license and began studying Morse code and theory for his General exam. His General class license arrived only days before his departure for the Jamboree, but once he arrived he wasted no time in putting it to good use. As a member of the K2BSA staff, Josh helped demonstrate ham radio to many of the 35,000 scouts attending the event, and to train some 400 scouts who earned Radio Merit Badges at the gathering.

Josh made an outstanding impression on leaders at the Jamboree. As a result of his demonstrated ability to connect with other scouts in attendance, he was selected to assist K2BSA

in a scheduled contact with the International Space Station. Josh calls this one of the highlights of his experience at the Jamboree.

Back home, Josh was invited by Frankford Radio Club member Steve Dobbs NE3F to be part of a multi-single contest operation in the 2001 CQ World Wide DX Contest. After seeing Josh's comfort level with the radio, antennas and logging program, he turned Josh loose to operate by himself. Dobbs later invited Josh back to operate under his own call during the ARRL Sweepstakes.

But being on the air was not enough to satisfy Josh. He knew that the BSA Hawk Mountain Council camp has recently completed construction of a new science center. It already had a computer room, an astronomy lab and a room reserved for "Electricity and Communications" studies. But the communications room was bare, so Josh decided to help fill it with amateur radio.

He began by talking about establishing an amateur radio station in the Science Center, and met with several adult advisors at the camp to discuss his proposal. He also recruited scouts he knew from the Order of the Arrow (a BSA honor campers' society). Josh worked to get them licensed and into having ham radio fun. He was on his way to making this dream come true, but another step was needed: sponsorship of a Venture Crew.

According to Josh, a Venture Crew is a special scouting program for older teens, open to girls as well as boys. Each crew has a specific goal or mission. Josh presented his idea for a radio Venture Crew to the Frankford Radio Club and obtained its support as the sponsoring organization. He then convinced the Hawk Mountain Council leadership to use space in a new science center at its headquarters for a permanent amateur radio station. This station will soon be available to campers the year-round. Meanwhile, Josh continues to spread the word of amateur radio to all who will listen. As recently as the weekend of May 3-5, Josh continued his Venture Crew recruiting drive at the Appalachian District BSA Camporee in Kempton, Pennsylvania.

There he put scouts on the air including contact with a scout camp in Nottingham, England. Another ham contact to Idaho yielded a 50-minute on-the-air presentation to the scouts listening in. What makes this an amazing story is the time line: Josh is a relatively new ham who received his first license and original KB3GOG callsign in early 2001!

Congratulations to Josh, to the two runners-up — Evan Anderson KC0CWP, of Ashland, Nebraska, and Thomas Tenaglia K3TAT, who lives in West Chester, Pennsylvania — and to everyone involved in the YHOTY program.

*Thanks to Newsline, Bill Pasternak WA6ITF, editor.*





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## "Great Spot" for News

Want to hear what's happening on the planet Jupiter? Just listen on the 15-meter band. So says *Popular Communications Magazine* in an article aptly titled "Listening to Jupiter on Your Shortwave Receiver."

No, you won't hear the latest scores from the Jupiter Red Sox playing the Mars Marlins. What can be heard is the natural sound of the orange giant. An electromagnetic wave is emitted at irregular intervals by Jupiter, with what the article describes as a sweeping, lighthouse-like sound.

All you need to listen in is a shortwave receiver that can tune the good old AM mode, and a decent antenna. Exactly how to listen and what to listen for is on pages 8 and 9 of the August issue of the magazine.

Thanks to PopComm, via Newsline, Bill Pasternak WA6ITF, editor.

## News from the Ham's Hack

Former computer hacker Kevin Mitnick N6NHG has turned author. Mitnick is the California ham whose license renewal application was designated for hearing by the FCC. This, based on his conviction for hacking. And now, according to news reports, he has written a soon-to-be-released book on computer hacking and — more important — how to prevent being hacked.

According to the reports, Mitnick's book — *The Art of Deception* — is a novel that describes more than a dozen scenarios in which hackers dupe computer network administrators into divulging passwords, encryption keys, and other security details. Mitnick claims that it's all fiction, with any personal details having been kept out of the book, and that he uses fictitious names of hackers, victims, and companies.

Earlier this year the FCC designated his application to renew his amateur licenses for a public hearing. The FCC contends that Mitnick may no longer possess the requisite requirements to remain a Commission licensee.

Thanks to Bruce Tennant K6PZW, via Newsline, Bill Pasternak WA6ITF, editor.

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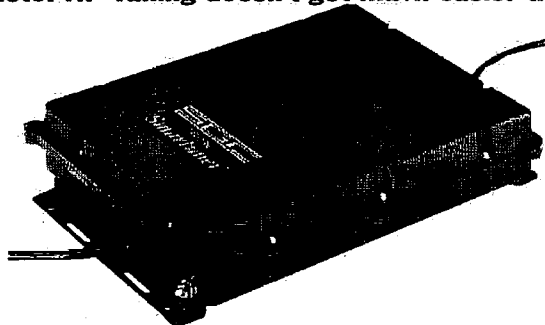
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# LETTERS

## From the Ham Shack

**Steve Brandt N7VS.** Dear Wayne: Thank you for donating a one-year subscription to *73 Magazine* to be given away as a door prize at our 2002 Pacific Northwest DX Convention. The happy winner was Susan Huntley, wife of Roger Huntley W7VV.

We had almost 140 people attend our convention. Among the participants were Tom Schiller N6BT of Force 12 Antennas, who gave a talk on "Switched Vertical Dipole Arrays"; Al Maenchen AD6E, "TI9M DXpedition"; and Lew Sayre W7EW, "The South Atlantic VP8GO/VP8THU Trip." The convention went very smoothly, and we had only a few very minor glitches which we were able to easily fix. All were having a good time, and we received many nice compliments afterwards.

Again, thank you very much for donating a subscription to *73 Magazine*, and best wishes on your current endeavors.

**Ray J. Howes G4OWY, Weymouth, Dorset, UK.** Just received my June issue of *73*. As always, my first port of call is the "Letters" page. However, when I saw the letter from Bill Pasternak WA6ITF, I nearly fainted. For one horrible moment I thought I was reading an obituary! Phew, I wasn't! Mind you, knowing how Wayne just loves to chew his way through all those raw vegetables — I should have known better, right?

Anyway, I'm glad to find out that I'm not the only person to realize the fact that the appearance of Wayne Green on Art Bell's overnight talk show wasn't because he missed the limelight! No, on the contrary, it was merely a convenient vehicle to rescue *73* from impending doom. So I guess those of us who enjoy our monthly dose of *73 Magazine* owe Wayne a debt of thanks, and of course, to Art Bell W6OBB for helping out when Wayne was in his hour of "need."

On the subject of "kit suppliers" in the June editorial, what about Elecraft? Their excellent QRP K1 and K2 transceivers are streets ahead of the competition — hundreds have been built and all work first time too. It's as if Heathkit has risen from the ashes. Strangely, I've never seen an Elecraft ad in *73* — or a review of an Elecraft kit — unless I missed it. Hmmm? QRP is probably one of the most popular facets of amateur radio — yet, why isn't there a monthly column dedicated to it EVERY month? The other mags can do it. On the plus side, *73* is headed in the right direction now that it has

more construction articles, etc. Long live *73*!

*Thanks for the mention of Elecraft. I keep prodding the readers to pepper me with letters, or at least E-mail, about any ham product they think others ought to know about. And to tell me about any exciting adventures amateur radio has provided them. WQRP is a blast, and I've always made sure when on DXpeditions to listen right down to the nose for the weakest of signals. — Wayne.*

**Gary Auchard WBØMNA, Leavenworth KS.** Wayne, you are always commenting in your editorials in *73 Magazine* on how little clubs/hams do to promote the hobby. Our club, the Pilot Knob Amateur Radio Club in Leavenworth, Kansas, is a good example of the exception to your comments.

We are a very active club with a lot of involvement in community activities. We have yearly classes for people interested in joining ham radio activities. We have a VE group that gives regular test sessions. We are active in emergency preparedness activities, and any event that will make us visible to the community. Our club has over 50 percent of the membership currently licensed as Extra Class with more achieving the top license at most every test session we conduct.

Our son and daughter are also licensed hams and have been for many years. I operate on HF, VHF, satellite, ATV, PSK31, packet, QRP, CW, and any mode that looks interesting. Building is one of my favorite pastimes. My wife and I have been licensed for over 25 years each. The hobby provides us with many hours of fun and is a great learning experience. We currently coordinate the VE testing sessions and always have a good turnout of people to test. Our last session we had 15 people show up. Not bad for a city of only 14,000 people. The interest is out there. You just may not be seeing it some times.

On another note, have you heard of "geocaching"? Briefly, it is a hobby using a GPS receiver to guide you to hidden caches of miscellaneous treasures people are hiding all over the world. These caches can be virtual caches like statues, and other permanent fixtures also. The bottom line is it gets you familiar with using a GPS receiver to find things hidden somewhere and, in a few cases, finding your way back to your vehicle. It's as much fun as fox hunting.

The ham radio part comes in when you're out in the woods and maybe get separated from your friends. If they don't have a GPS receiver with them, you can keep track of them via 2 meters if they are a ham. Of course, if you get hurt you could possibly call for help, too.

Check out this Web site for more info: [www.geocaching.com]. It's a lot of fun, and you learn a lot and get some great exercise in the process.

*Thanks for reminding us, Gary. We first mentioned geocaching in our April 2001 issue. — J.B.*

**Lowell "Van" Slot W2DLT, the "Teletype guy" in NJ.** Wayne, so glad I happened on your Web site, glad to see an "old" friend is still out there doin' things. I remember when you sat under a tree at our East Coast VHF Hamfest selling *73* number one at \$.37 or "TWO FOR 73¢." Sure wish I had one of those original #1s — could probably retire ...

Enjoyed my ads and the results they brought all the years in *73* with "deskfax" and Teletype stuff ...

Enjoyed visiting Mount Monadnock with my new wife (on our honeymoon) and remember seeing a printing press in the front hall of your "mansion."

Many happy memories ... loved your columns and talks at Dayton ...

Incidentally, just last weekend I put up an inverted "V" at our lakehouse in Hemlock Farms, Lords Valley, PA, and got on 40m for the first time in almost 20 years with my Kenwood twins and worked about 10 states right off the bat. Guess the old "knack" doesn't leave you with age ... I just turned 60 this year ...

Anyway, hope you remember some of those memorable occasions I tried to share ...

**Les Linton, Tracy City TN.** Wayne, because of your constant carping, I'm drinking freshly brewed green tea, distilled water (went out and bought my own distiller!), juicing, and eating salads for roughage. I've lost 47 lbs.

And I started walking when the weather improved enough to do so.

I just wanted you to know that if you can have that much effect on ME (!), imagine the effect you are probably (unknowingly) having on many others! So I HAVE stopped poisoning myself! Thanks, for many things ...



# IF Test Box

*A real "can"-do project.*

*IF cans are difficult to hold and measure because of their size, etc. This unit enables the builder/experimenter to place the unknown "can" in a convenient holder to perform measurements, and has an oscillator circuit to experiment with. Easy and inexpensive, this is an excellent project for the home-brewer.*

**H**ave you ever tried to hold leads on the pins of a 10 mm IF "can" to take continuity or inductance measurements? It's not an easy task, even at the best of times. Building home-brew ham gear is my primary source of enjoyment, and the using of salvaged parts plays an important role in keeping costs down. The problem is that my junk box has an excess of salvaged "cans," and the values and winding information aren't known without making measurements.

Here's a weekend project that's not

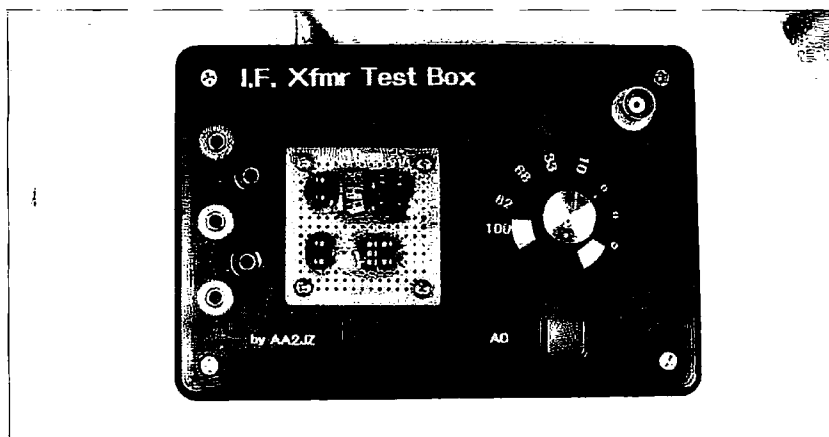
particularly difficult, won't cost very much for parts, and is quite useful when completed. The majority of the parts I used were from the proverbial "junk box," but I have included numbers from Radio Shack should you need them.

This unit will allow you the pleasure of "plugging in" an unknown IF "can" to make continuity and inductance checks without the hassle of holding the can in your fingers, etc. With power applied, an FET oscillator circuit is activated. The output is fed to

an RF connector leading to your frequency counter for measurement. A multiposition selector switch will enable you to select various capacitors placed across the primary winding for experimentation. See **Photo A**.

Amateur radio QRP projects most often use IF cans in the 9 through 11 MHz range, of which 10.7 MHz is quite common. That's plus or minus a few hundred kilohertz. The oscillator section isn't intended to be a precision circuit, but will provide indication that the IF "can" inductor/capacitor combination is appropriate and will oscillate, thereby proving the parts are "good."

The first part of this project will be the construction of the "plug-in" circuit board and associated banana jack receptacles. After trying various DIP (dual inline package) sockets, I found that the secondary side of the transformers, the side having two pins, fit nicely across a 16-pin DIP socket. The primary side with its three pins isn't so agreeable. Here a little trial and error with SIP sockets proved to be the answer. The capacitors with the dotted lines marked "CX" represent capacitors you could plug into these locations, but are NOT hardwired to the board. See **Fig. 1**.



**Photo A.** This IF Test Box utilizes mostly "junk box" components and a few added pieces of hardware. Take those unknown cans and just plug them in to check them out.



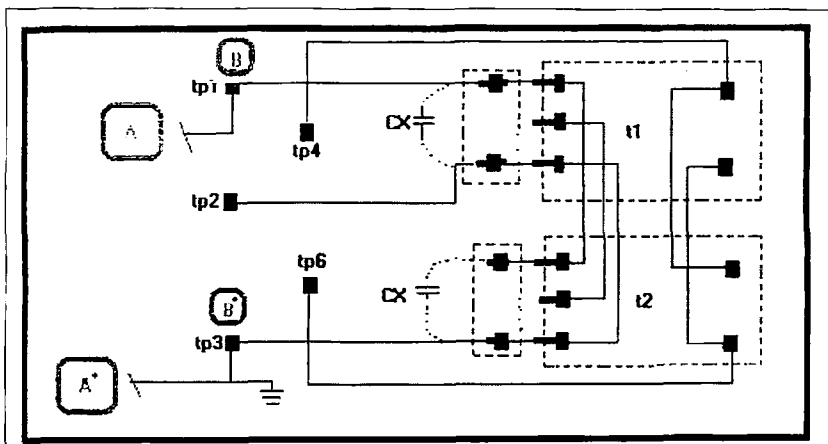


Fig. 1. Plug-in circuit board. TP 1 through 6 are RS 274-725 (2 packs); circuit board stock used HS 276-148 (1/2 used).

SIP sockets are intended to hold memory, etc., in some computers. Their "single inline package" makes them an easy candidate for separation. I cut the strip into several lengths and attached the first "hole" of each to a pin on the primary side of the transformer. Using the transformer with SIP parts attached as a guide, locate the appropriate holes in the circuit board and solder them in place. Once the location was found for the socket parts, I applied epoxy cement to all sides of the sockets to ensure a stable environment. Having extra parts of the 16-pin DIP socket remaining, I used two of them in parallel with the primary winding to allow insertion of capacitors for experimentation purposes.

Subminiature IF cans (8 mm) are

also salvaged, so I included a socket to hold them. They conveniently fit the spacing of a 16 pin DIP socket and this was easy to include on the board. This socket was "bridged" to the 10 mm socket wiring.

The "banana plug" jacks, red for primary and black for the secondary windings, were placed evenly on the surface of the project box. The surface of the project box was measured and cut to allow the underside of the circuit board to be exposed to the inside of the box. See the attached photos for clarification. I know what I mean, but sometimes pictures can show you better than I can tell you.

The rotary switch, with its NPO capacitors, were attached to the surface of the closure. The values of the capacitors are those I chose to use for experimentation. Your unit can include values you deem more appropriate for your circuits. I have found that the tuning capability of the transformer and using a capacitance value near that which is required will produce the desired result. See Fig. 2.

The next part of the project to be completed was the power supply. It's not an involved unit, just something to provide the 12 VDC needed to operate the FET oscillator. I used a salvaged LM317T regulator, bridge rectifier, and transformer. Almost any small transformer capable of 17 to 20 VAC or greater on the output side will suffice for this project. Physical size was of more importance than the output

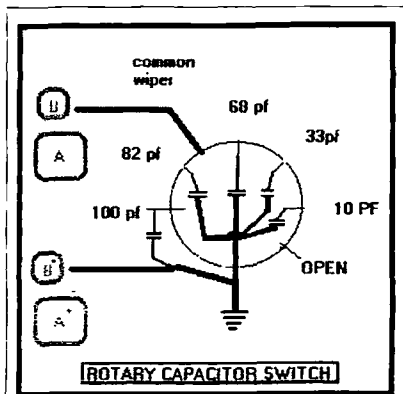


Fig. 2. RS 275-1385 switch or similar. Items marked A & A\* and B & B\* are connected to both the oscillator board (Fig. 4) and the plug-in circuit board (Fig. 1). All NPO capacitors used.

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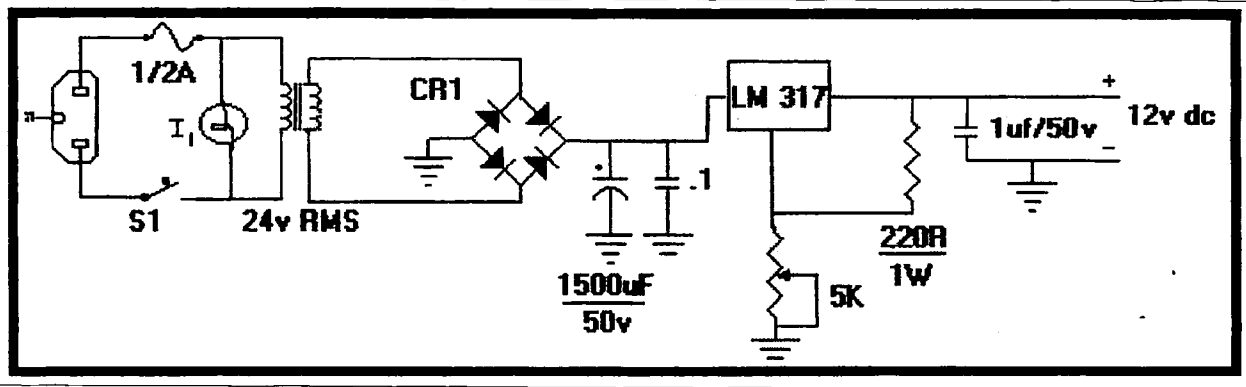


Fig. 3. Power supply, 12 VDC. *I1* is RS 275-617a, *S1* is RS 275-1565, *T1* is equal to 273-1366, all other parts are from salvage.

voltage, as long as it is great enough for the regulator to provide 12 volts DC. See Fig. 3.

Fig. 4, an MPF102 FET oscillator with buffer and amplifier circuits, was assembled next. It took some experimentation to choose the correct capacitors for reliable oscillation. Reliable oscillation was achieved using a 22 pF coupling capacitor with two 43 pF silver mica units for the frequency-selective part. This variance from standard values for a 10.7 MHz circuit is likely due to the stray capacitance induced by the wiring, etc. Remember, this is an experimenter's box, not a high-tech measurement device.

Shielded cable was used for the connections from both the tank circuit and the output to the RF connector. This adds immeasurably to the stability of the circuit and shouldn't be ignored. Photos B and C show the location of the power supply strip to the left and the oscillator board to the right side of the closure. The oscillator on the right was necessary to provide clearance for the switch.

#### How to use the project after completion

This brings us to a point where what's in your "junk box" must be identified. First identify the windings on the primary and secondary sides of

the transformer being tested. Plug the transformer into the appropriate location and check for continuity between pins one, two, and three of the primary side with a VOM. The secondary side, pins four and six (five isn't used), should also be a short circuit. The rotary capacitor switch should be set to an "OPEN" position.

Using an inductance meter, measure the value of inductance available from the circuit by tuning the slug from top to bottom. Make notes of these values for future reference. Lacking an inductance meter, the next best method of knowing what the values of the coil are is to place it in an oscillator circuit and measure the output.

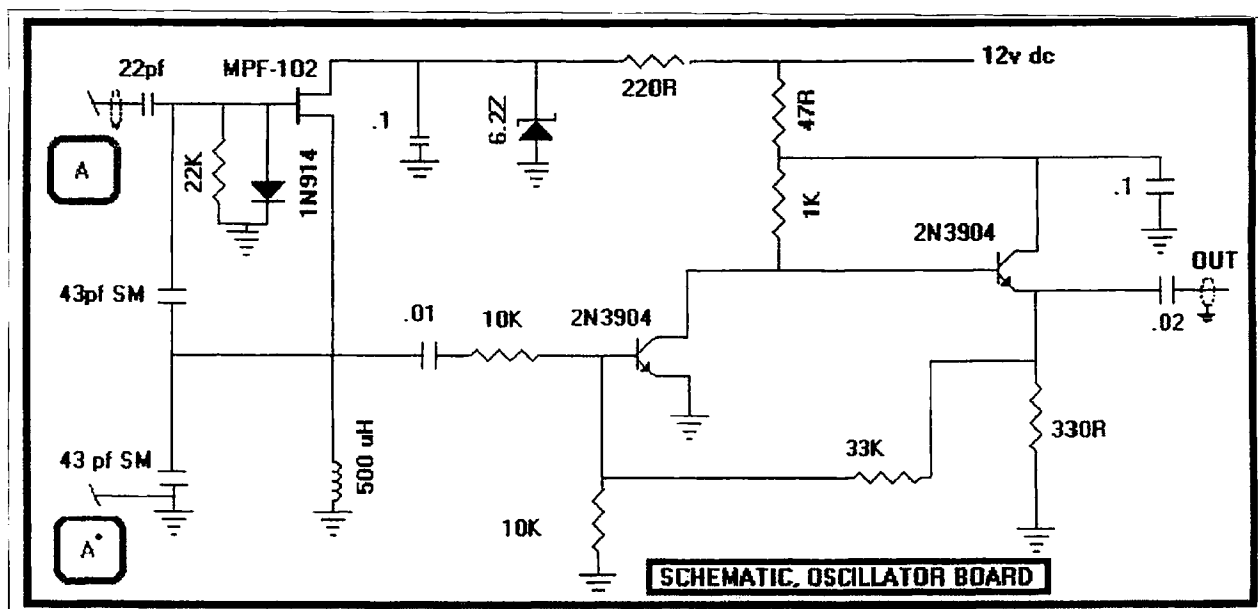
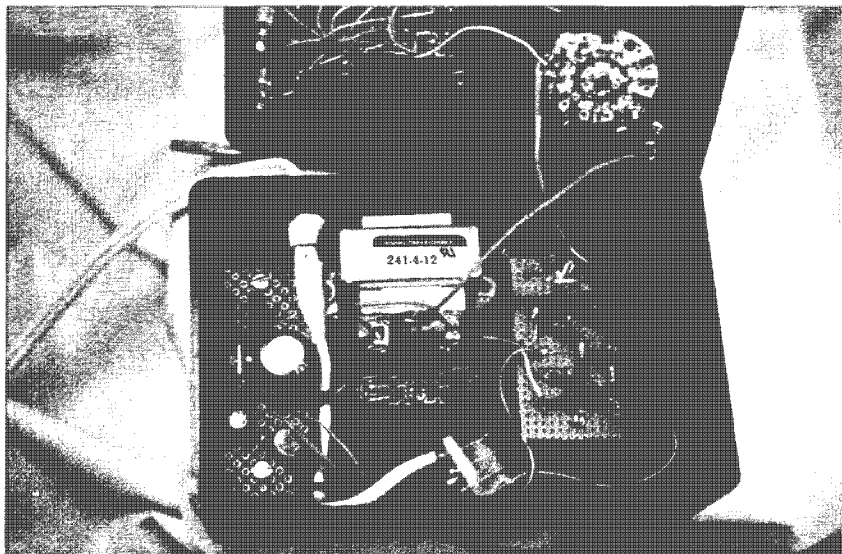


Fig. 4. Oscillator board. All resistors 1/4 W, SM = silver mica, 0.1 = 104, 0.01 = 103, 0.02 = 203 or 223. All parts were salvaged units. 2N3904 is NTE part number NTE-123; other substitution parts should work in this circuit.





**Photo B.** AA2JZ placed the oscillator board to the right to provide necessary clearance for the switch. The power supply strip is to the left.

Remove your VOM leads from the test points, connect a suitable RF connection cable to your frequency counter and apply power to the set. If the transformer has the suitable inductance and has a capacitor of approximately 50 pF in parallel with it, there should be a reading near 10.7 MHz on your counter. If you suspect that the transformer you selected hasn't the required capacitor installed, rotate the capacitor select switch through each position while watching the frequency counter for a stable output.

IF cans specified in many projects are the 42IF123, and are 10.7 MHz tuned tanks, having a 50 pF capacitor

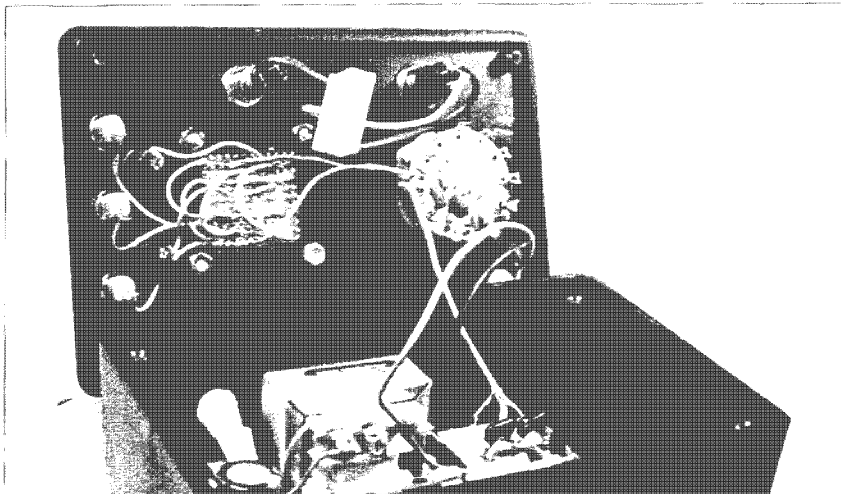
in parallel with a 2 to 5  $\mu$ H tuned coil. The secondary side has a single turn between pins 4 and 6, while the primary has 5 turns between 1 and 2, and 5 turns between 2 and 3. I have rewound many salvaged cans to the above specifications and have used them in projects where they performed well.

This is a project that isn't difficult to build, is useful, and offers builders the opportunity to reclaim salvaged parts.

Happy building!

73

**Say you saw it in 73!**



**Photo C.** Inside the top.

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# Mobile Ham Repeater

*Isn't it time your club had one?*

*Our ham club has an operating low-level 450 MHz repeater covering part of Los Angeles and surrounding cities. However, our club decided that during an emergency situation, a backup mobile repeater system would be desirable.*

The conditions imposed required that the repeater would have to be portable to the extent that it would operate off of 12VDC and have an RF output power greater than 10 watts. The use of a controller module was deemed unimportant in this application. That means the repeater had to be capable of operating in almost any vehicle having an outside antenna.

After looking around swap meets for a suitable radio, we found a Pace Landmark 3 Series 450-512 MHz transceiver that appeared to be just what the doctor ordered, since it was

designed to operate as a duplex radio for mobile applications. The physical size was just slightly larger than one of the older-style CB radios, making it convenient to handle physically. Because the radio was set up originally to operate in a commercial environment, long-term reliability was built into the unit.

Extended operating periods are typical for repeater operation, which makes the Pace radio ideal for our ham club application where short-term use is common. **Photo A** shows the completed repeater package shown in an inverted position. Rubber feet have been placed on the flat side of the duplexer that is used as a bottom. The repeater is intended to remain un-mounted so that it can be easily moved from one location to another.

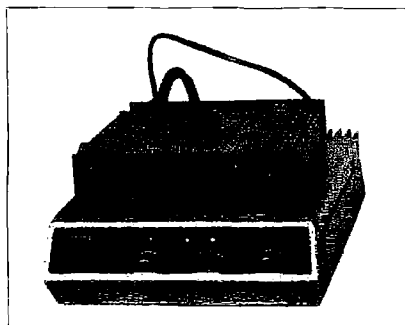
The advantage of operating the radio inverted allows the RF power amplifier heat sink to be in the open allowing for free airflow. It was found that a cooling fan was not required. However, the heat sink would have to remain in the clear with the fins positioned vertically for best cooling.

Pace Landmark Series 3 radios came in two versions, one is the front mount as shown in **Photo A** and the other is

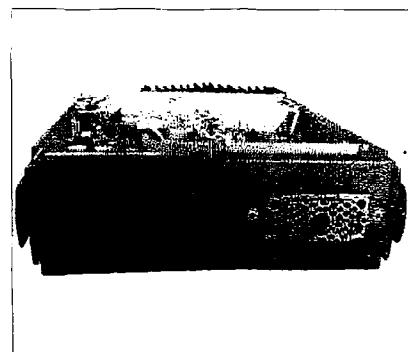
the trunk mount as shown in **Photo B**. With the exception of the front panel, the two radios are identical.

To place the radio into a ham repeater application, several modifications were required, which will be outlined here. Modifications that I found necessary are as follows: (1) shifting the frequency from the commercial band into the ham band; (2) adding a CTCSS decoder; (3) modifying the audio path; (4) adding a small power relay for keying the transmitter; and (5) adding a duplexer.

Although the radio will function as a repeater while using two separate



**Photo A.** This is a picture of the completed portable repeater. A Telemobile Duplexer is mounted to the radio, allowing it to operate with one antenna.



**Photo B.** This is the trunk-mount version of the Pace Landmark 3 Series of duplex radios.



antennas, for convenience a Telemobile Duplexer was added to allow the use of a single antenna. The use of the duplexer also helps reduce the desensing of the receiver as a result of having the transmitter close by and a -5 MHz split between the transmit and receive frequencies.

Also, we wanted modifications to the existing radio to be held to a minimum. In other words, add what's required without cutting up the original circuit.

To provide some insight into the makeup of the radio, **Fig. 1** shows the signal flow throughout. **Fig. 2** shows where the add-on circuits are connected, allowing the conversion from a duplex radio to a CTCSS-controlled repeater with the least amount of radio modification. **Fig. 3** shows the bottom side of the radio, the add-on connect points, and placement of the PTT relay. **Fig. 4** shows the top side of the radio, three connect points, and the location of the transmitter's critical tuning adjustment.

#### Frequency shift

As received, the radio was intended to be frequency-programmed using a pair of PROMs. Although nice, PROMs are not required to operate the radio, and shifting the frequency of the transceiver is reasonably easy to establish the new frequency. I tried two techniques as PROM substitutes and both methods work well. One method was to place two DIP switches on a small circuit board, and the other method was to install a pair of DIP headers. In either case, the respective programming code lines are allowed to float high while the remaining codes pins are grounded.

I made up the DIP switch circuit boards and included pull-up resistors for the code lines. I later determined that pull-up resistors were unnecessary since the synthesizer IC provides logic line pull-up. Without the pull-up resistors, the DIP pin headers work satisfactorily in programming the radio to the desired frequency.

My homemade circuit board using switches is shown in **Photos C and D**. **Photo C** shows the top side of the

board and placement of the switches. **Photo D** shows the bottom side of the board where two 16-pin headers are mounted. The pin headers are aligned to mate with the PROM sockets located on the synthesizer board. Wiring is essentially pin-to-pin between the PROM socket and the switches. For the conversion, the switches provide a hard pull-down for a "0" logic code and the IC provides an internal pull-up for a logic "1".

The synthesizer used in the Pace Landmark radio is called a dual modulus frequency synthesizer, and it utilizes a Motorola MC145152 IC. **Photo E** shows the bottom side of the radio and the location of the synthesizer.

Although I'll not go into theory detail as to how the synthesizer operates, I will provide the key information required to shift the operating frequency to within the 440-450 MHz ham band. The synthesizer is divided into two

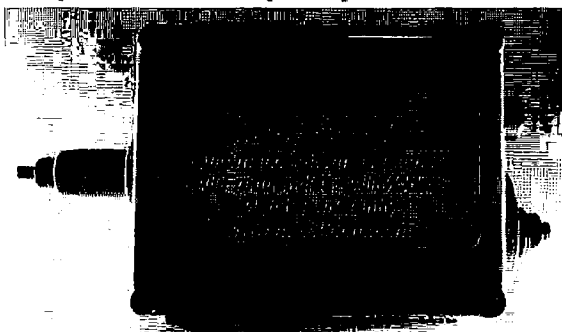
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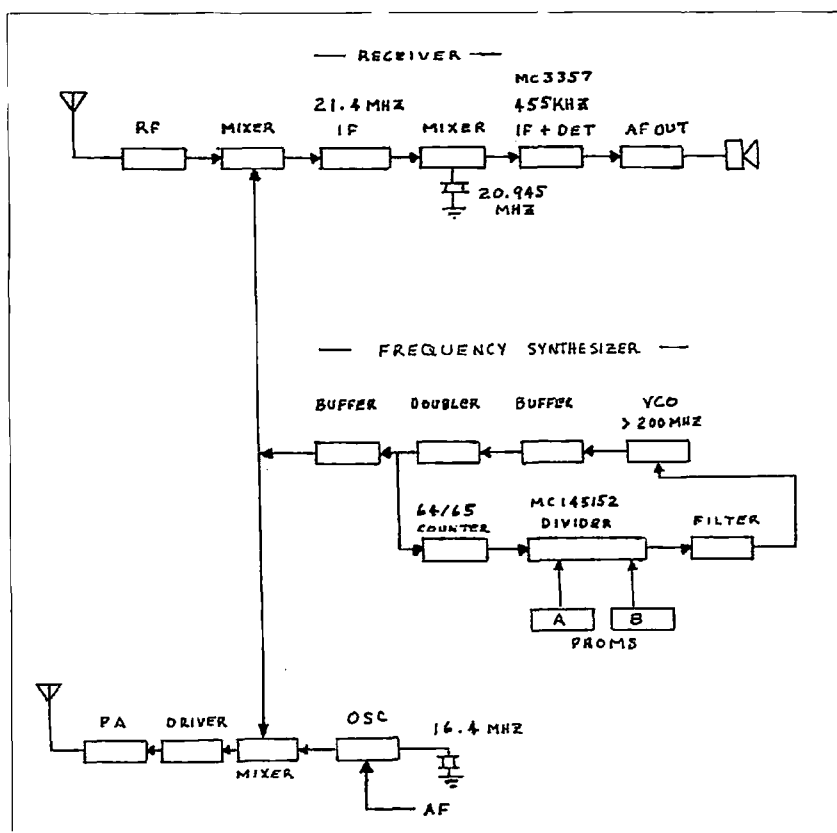


Fig. 1. This is a block and signal flow diagram of a Pace Landmark 3 Series duplex radio.

parts that are designated as "A" and "B". Once "B" is set, then "A" is used to step through the band. For commercial operation, a step frequency of 12.5 kHz was used, and I chose to NOT make a change in that portion of the synthesizer's operation.

For use in the Los Angeles area, ham repeaters are set up to operate in 10 kHz steps, which translates to the Pace setting up, at many frequency settings, 5 kHz off of a desired repeater channel. Rather than change the synthesizer to accommodate a 5 kHz or 10 kHz step, I chose to fudge the final frequency.

By this, I mean that I set up the synthesizer to operate 5 kHz away from the desired channel frequency using the switches/DIP header and then tweaked the 6.4 MHz master oscillator crystal until the operating frequency moved over the desired 5 kHz and onto the repeater's desired channel frequency. The crystal frequency can be "rubbered" easily with the trimmer capacitor provided.

When in operation, the transmitter and receiver are separated in frequency by 5 MHz. After tweaking the oscillator, the step switches/DIP header will still set up the dual modulus synthesizer at 12.5 kHz steps. However, for our club's situation, having the repeater set up for operation on our assigned frequency was all that was required, making the DIP switch option unnecessary. Therefore, tweaking the master crystal frequency was the most expedient technique and required the least modification to the existing radio.

### PROM substitute

Calculating the numbers to achieve a desired frequency is done through an iteration process using the equation shown in Table 1. As an example of how the process works, let me lead you through the steps.

The first step is to determine the desired transmit (channel) frequency that is to be used — let's use 449.425 MHz as an example. Using the equation, we need to find the number represented by "NT", where NT will be made up of two numbers. One number will be the "A" divider and the other will be the

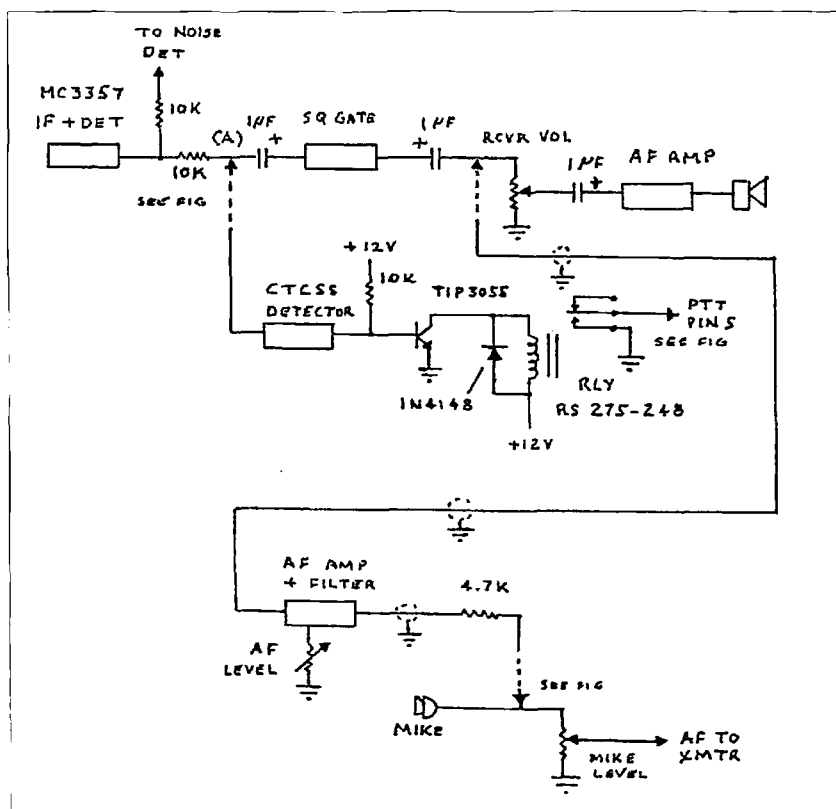


Fig. 2. The add-on circuits and where they are attached to convert the radio to a ham repeater.



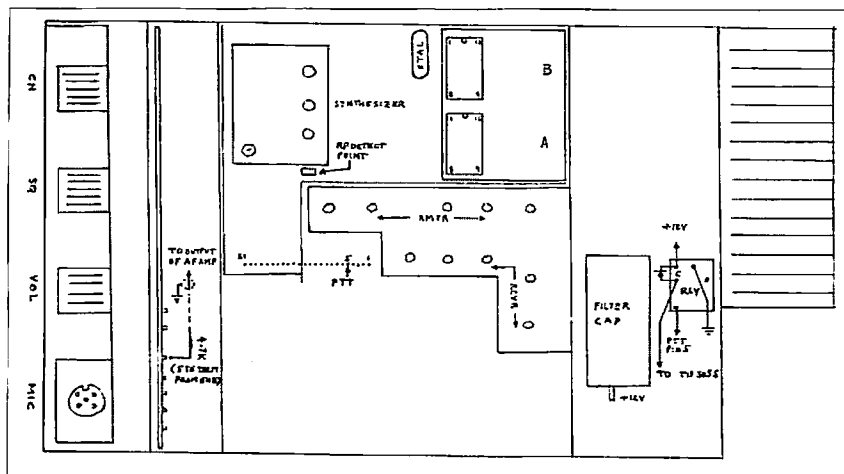


Fig. 3. The bottom side of the radio. Tuning adjustments and connect points are identified.

"B" divider. Plugging the selected frequency into the equation, we obtain an NT number equal to 37266. Now, here is where the iteration steps come into play to find the value of "A", since the next step is to subtract the value of "B".

Before continuing, let me discuss how the values of "A" and "B" are to be determined. The value of "B" will be a whole number between 0 and 64, and selecting a midnumber arbitrarily is typical as a starter. After selecting a number, it is subtracted from 37266, as in our example. The value of "A" must also be a whole number and, as the iteration process proceeds, the number value will follow the shape of a "U" curve, if plotted. What this means is that the value of "A", when not correct,

will have a decimal remainder where the remainder will decrease as the "whole number" is approached. Or, the remainder will increase as you move away from the desired value.

Following that process, let's continue with the steps. Choose a whole number value for "B" and subtract it from 37266 to create a new number. Divide the new number by 64. If the "A" number is "whole," you made a good guess in the selection in the number for "B". In most cases, the new number will have a decimal remainder. Write down the number for reference. Then advance the selected value of "B" and repeat the process.

When the new number is calculated, compare the remainder of this remainder to the first one. If the remainder is

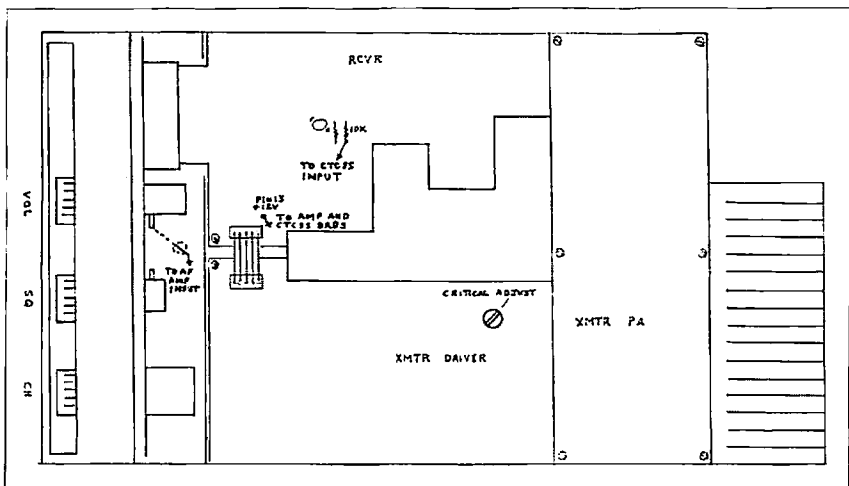


Fig. 4. This is the top side of the radio. Several connect points and the transmit driver critical adjustment are shown.

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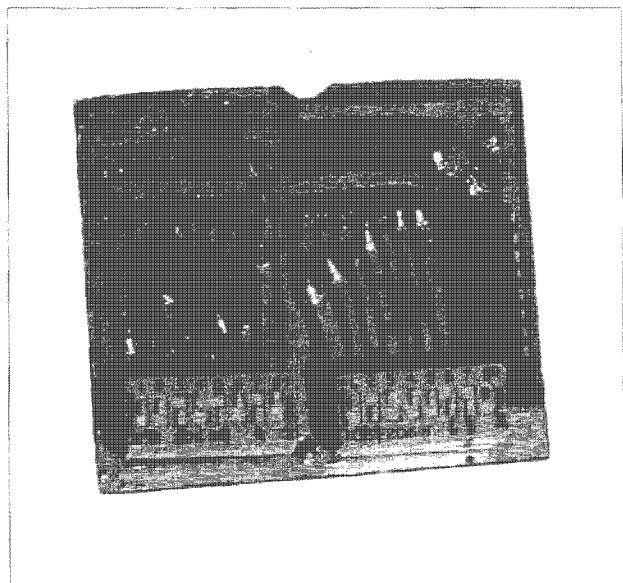
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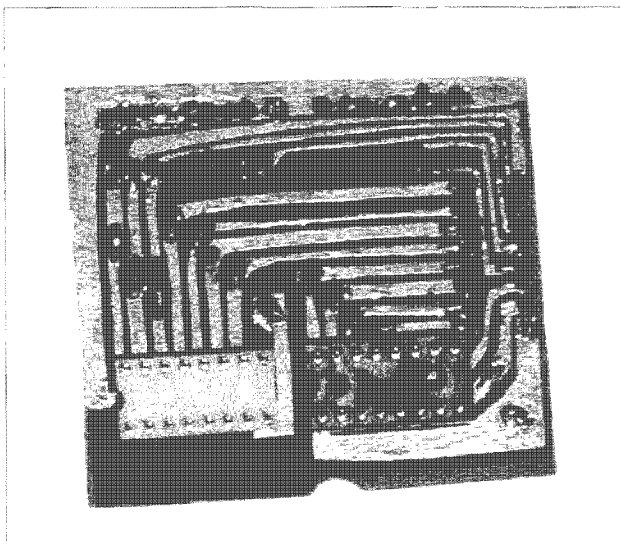
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**Photo C.** Top side of a switchable PROM substitute board that can be used to program the repeater's operating frequency.



**Photo D.** This is the bottom side of the PROM substitute board. "Z" wires are used to transfer circuits from one side to the other of the board.

lower, then your selection of "B" is advancing in the correct direction. Select a new "B" value and repeat the process until the new number becomes "whole" without a remainder.

Using the iteration process in our example, the values for "A" and "B" came out as B = 18 and A = 582. Using the table shown in **Table 2**, we can determine which DIP header terminals are to be left open, with the others tied to ground. For the "B" header (which is closest to the casting wall), pins 2 and 5 are allowed to float setting up a divide code of 18. Pins 1, 3, 4, 6, and 9 are grounded.

DIP header "A" is set up to divide by

582, which is accomplished by allowing pin 7 of header "B" and pins 2, 6, 7 of header "A" to float. Pins 1, 3, 4, 5, and 9 of header "A" are grounded.

After the DIP header has been programmed as in our example, the synthesizer will operate at 465.825 MHz, that is, 16.4 MHz above the selected channel frequency.

### Tuning up the radio

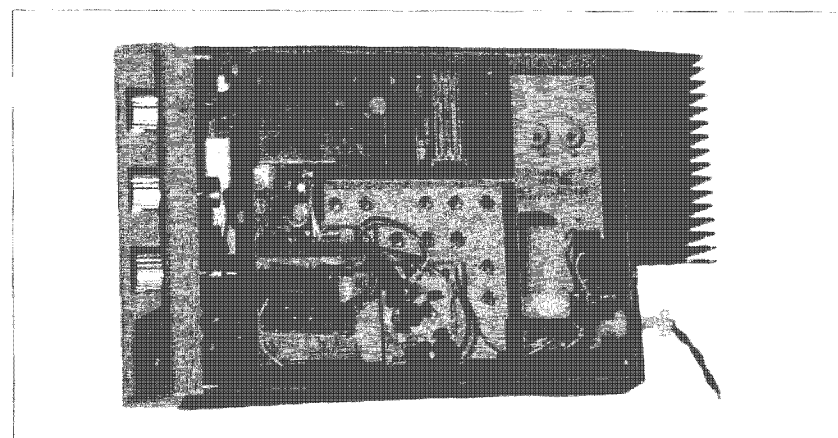
Tuning the receiver and transmitter is very easy if an RF amplitude detector is used. Metering of the internal circuits to find resonance of individual circuits is really the most difficult approach, though feasible. I found an

RF amplitude detector to be the easiest to use, and tuning up the radio could be accomplished in just a few minutes. The following is a listing of the preferred test equipment that is needed to tune up the radio: (1) tunable receiver with an "S"-meter and covering the frequency band of 440-470 MHz, or a spectrum analyzer covering the same frequency range; (2) a receiver or spectrum analyzer tunable to 21.4 MHz; (3) power output meter with a dummy load; and (4) a signal generator for the receiver's new input frequency.

Assuming that either a spectrum analyzer or a tunable receiver is available, the first step is to select a frequency equal to the synthesizer's output — in this case, 465.825 MHz. Place the detector probe near the output of the synthesizer. There are two white coaxial cables attached to the output point on the board (see **Fig. 3**). Decrease the probe's proximity distance to the coax cables until a signal is detected. With the presence of a signal at "465.825 MHz", tweak the synthesizer tuning adjustments to peak the RF output. Once peaked, the synthesizer tuning is complete and no further adjustments are required.

Tuning the receiver is equally as easy as doing the synthesizer. Use the following steps:

- (1) Attach the RF detect probe



**Photo E.** This is a picture of the bottom side of the radio. The synthesizer is located on the circuit board with the metal shield.



$$NT = \frac{\text{XMT freq} + 16.4\text{mHz}}{0.0125} = (64 \times A) + B$$

Example:

XMT channel freq: 449.425mHz  
 Synthesizer freq: 465.825mHz

$$NT = 465.825 / 0.0125 = 37266$$

Choosing B=18:

$$37266 - 18 = 37248$$

$$A = 37248 / 64 = 582 \text{ (must be a whole number)}$$

Results: B=18 and A=582

DIP header setup:

PROM	pin #	Divide by N	LOGIC
"B"	2	16	HI
"B"	5	2	HI
"B"	1,3,4,6,9		GND
	8 Ground		LO
"B"	7	512	HI
"A"	2	64	HI
"A"	6	4	HI
"A"	7	2	HI
"A"	1,3,4,5,9		GND
	8 Ground		LO

**Table 1.** The equation used for determining the divide-by numbers for frequency programming the radio. In addition, an example is provided showing how the divide numbers are used to program a channel of operation.

through a 0.01  $\mu$ F capacitor to pin 16 of the MC3357 detector IC.

(2) Adjust the RF detector to 21.4 MHz.

(3) Connect a signal generator to the antenna connector of the receiver and adjust the generator's frequency to the receiver's channel frequency (5 MHz below the XMT channel frequency). Using our example, tune the generator to 444.425 MHz.

(4) Raise the RF output from the generator until a signal is detected by the RF probe/receiver.

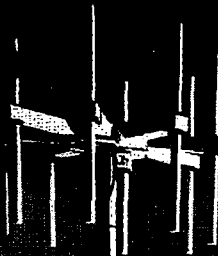
(5) Adjust each of the receiver's five helical resonators, as shown in Fig. 3, to obtain a signal peak at 21.4 MHz.

(6) Reduce the generator's output signal level and perform a final peaking of the five adjustments.

(7) Tuning of the receiver is complete.

Tuning of the transmitter is equally as simple as doing the receiver, though there are more adjustments to make. During the adjustment of the transmitter, keying of the transmitter will be required using either the microphone's PTT button or by temporarily grounding pin 5 on the contact

## TRANSMITTER LOCATION

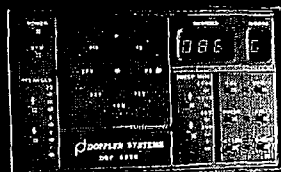


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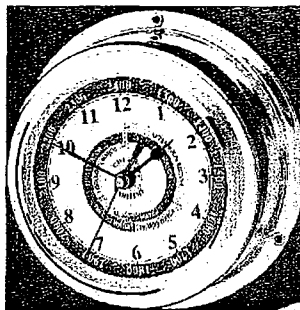
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" " 3	8
" " 4	4
" " 5	2
"B" 6	1
"B" 7	512
" " 8,15	GND
"B" 9	256
"A" 1	128
" " 2	64
" " 3	32
" " 4	16
" " 5	8
" " 6	4
" " 7	2
" " 8,15	GND
"A" 9	1

**Table 2.** The DIP socket binary divide-by-N values as a function of pin number. Note that socket "B" carries the 512 and 256 divide-by-N for the "A" PROM.

strip (see Fig. 3). Adjustments are made first using an RF receiver probe tuned to the transmitter's output frequency of 449.425 MHz, as in our example. Once power is detected and indicated on the power output meter, the receiver's RF probe may be removed. Fig. 4 shows the top side of the radio and the location of the receiver and exciter boards. Here are the steps to follow:

(1) Attach the wattmeter and RF dummy load to the transmitter's RF connector.

(2) Position the RF probe to a location near the collector output of the RF power driver transistor.

(3) With power applied to the radio, key the transmitter.

(4) Position the RF probe to obtain a signal indication.

(5) Adjust each of the five XMTR tuning screws for a peak indication at the RF probe's receiver (see Fig. 3).

(6) On the exciter board, you'll note numerous ceramic trimmer capacitors. Adjust each to obtain a peak RF indication on the probe's receiver.

(7) Adjustment of one trimmer capacitor, shown in Fig. 4, is critically sensitive to tool capacitance. When this capacitor is adjusted, the transmitter's output power should be evident on the RF power meter.

(a) Peak the adjustment for maximum power output and take note of the signal level. Remove the tuning tool and release the PTT allowing the transmitter to recover.

(b) Key the transmitter and note the power output. If the power value is the same as it was when it was peaked (as in "a" above), then the adjustment is correct and complete. However, if the power is low, touching the tuning tool to the capacitor should restore the power to near maximum. If this occurs, increase the capacitance slightly to compensate for the tool capacitance. Repeat the above test after each minor adjustment, until the power out remains high.

(8) With power output shown on the power output indicator, peak all of the transmitter adjustments to achieve maximum RF output into the meter.

(9) All transmitter adjustments are complete.

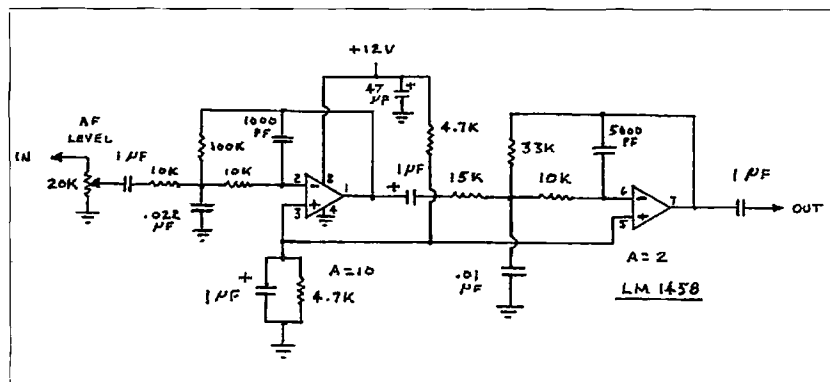
## Audio

Coupling audio from the receiver into the transmitter required a lot of experimentation on my part before I was satisfied that it was suitable. Three things came about requiring investigation during the process: (1) obtaining the correct pass-through AF level; (2) stopping RF feedback from creating an audio squeal; and (3) obtaining the correct de-emphasis. At this point I doubt that I've set up the correct de-emphasis time constant, but the resulting audio quality appears suitable for communications. Some additional work in the audio shaping is warranted, but may not happen in this club's repeater.

Stopping RF feedback and coupling audio created the greatest effort in the process in converting from commercial to ham repeater operation. The diagram shown in Fig. 2 shows the audio path, CTCSS connection, and the keying relay. The objective of the new audio path as shown is to bypass the built-in audio output stage, allowing the original stage to be used for local monitoring of incoming signals, yet have it not interfere with the pass-through audio during repeater operation. Also, the local microphone is still usable by a local operator.

The normal de-emphasis within the radio is done within the audio amplifier circuit, making it necessary to create an alternate de-emphasis audio path for repeater audio. To achieve a small amount of amplification (a gain of approximately 20) in addition to creating de-emphasis, I used a cascade filter using an LM1458 IC as shown in Fig. 5. The circuit board that I used is shown in Fig. 6.

There are no special requirements for the board layout. What I did determine to be necessary was the use of shielded wire to carry the audio between the radio and the filter module. In the absence of small flexible shielded audio wire, RG-174 coax makes a desirable substitute. A TIP3055 power transistor was also mounted on the audio board for convenience. The purpose of the transistor is to "key" the PTT relay.



**Fig. 5.** This is the audio de-emphasis filter and amplifier that I used. A maximum gain of 20 was deemed satisfactory to drive the microphone input for repeater operation.







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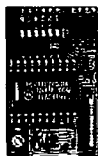
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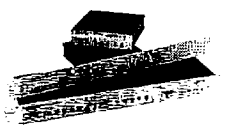
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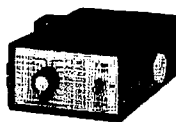
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transistor (most any NPN TO-220 device will work) is used to key a transmit relay. The keying relay is visible in **Photo E** and shown in **Fig. 3**, where it is placed near the large electrolytic filter capacitor toward the rear of the radio. A dab of contact cement was used to attach the relay to the casting. A ground connection for the relay was obtained by routing a short wire over to the ground lug on the receiver's antenna connector. Openings in the casting allow connecting wires to be routed between the desired tie points.

### Trunk-mount version

The only difference between the trunk-mount and front-mount radios is the front panel. Unless there is a desire to operate the trunk-mount radio remotely, the only thing required for the radio to operate is to place a jumper wire between front panel connector pins "E" and "N" — this jumper substitutes for a remote power-on switch.

**Fig. 7** shows the front panel connector, pin functions, and external controls needed to operate the radio remotely. Internal volume and squelch pots are mounted on the front panel and accessible through two holes in the panel. For repeater operation, these pots are set and then left alone. When the radio is controlled remotely, these pots are adjusted to one end, allowing the remote pots to perform the function.

### Conclusion

Our club has had a lot of fun just playing with the repeater since it was completed. It has been moved around to various areas within the vicinity of Los Angeles just to see how well it would perform, and so far it has proven to be a satisfactory portable and emergency repeater.

If you or your club is interested in having a portable repeater, I'd suggest modifying a Pace Landmark 3 Series radio for your repeater application. The next step is to scout the swap meets for a radio, and then enter into the modification process. Then write up your project for 73, of course! **73**



# Inside Today's Kit Biz

*An interview with Marshall Emm N1FN.*

*I remember the first kit I built. It was a 40-meter DC receiver. I had no idea how the circuits worked. The building in itself fascinated me. After spending hours reading and soldering, I inhaled deeply, and with index finger trembling, I flipped the "ON" button.*

As the sounds crackled to life, a shout of utter delight exploded from my lungs. Jumping midway in the air, I suddenly saw the clock — 1 a.m. My wife ran into the kitchen with a look of dismay. Relieved that I had not killed myself (maybe not, come to think of it and considering the time), she went to bed shaking her head in disbelief. There is something primal in the fact that a radio reaches out to the world after being built by your own hands. As humans, we hunger to communicate with others. Even a lone mountain climber needs to hear the sound of his echo.

Recently, I set out on a journey to resupply my radio shack with kits and limited home-brewed items. Letters went out, and only a few companies responded with the exact items I required. Scratch building at the time was not within my abilities. Not all of us are electronic wizards who dream of schematics in the sky. We depend on other hams to supply our desires for designs.

That's when my telephone rang. A calm voice asked for me by name, and one hour later I knew that my search had not been in vain. It was Marshall Emm N1FN, president of Milestone

Technologies, Inc., which is better known through its trading names of Morse Express and Oak Hills Research. He is an amateur operator who provides tremendous service through radio equipment.

If hams have guardian angels on Earth, mine had made a personal call. Call them Elmers, neighbors, or just friends if you like. But, each of them is a huge support factor in our hobby.

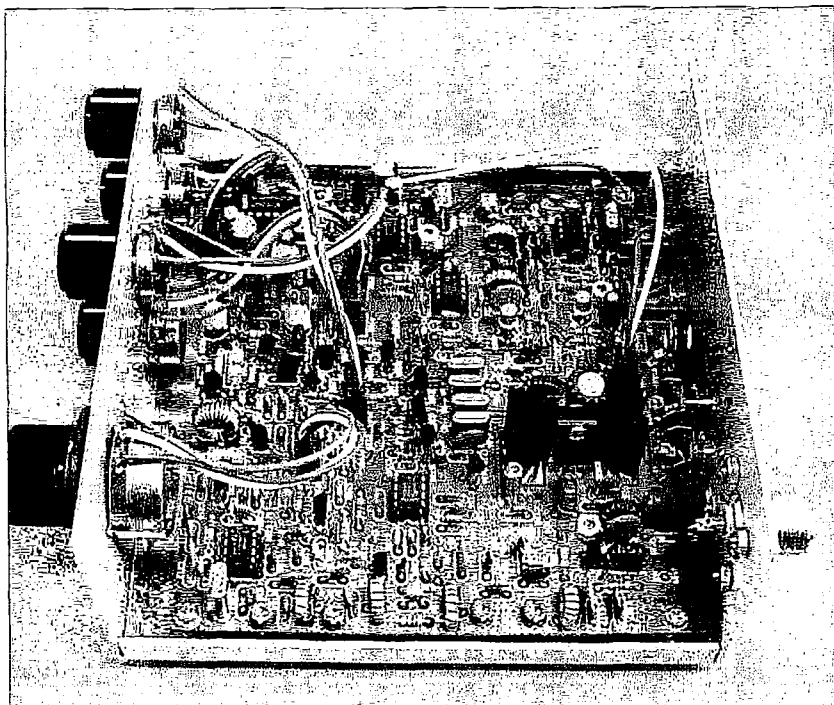
They must never be taken for granted. Never.

Marshall is more than a ham — he is a man who looks out for the future of the hobby with great care. The ham bug bit him while he was in the 8th grade. During the sixties, with his interest in electronics, chemistry, and rocketry, he more than likely helped to pioneer the term "geek." And, his pioneer character became the catalyst for



*Photo A. Larry N2WW/UA6HZ forgoes his towers, beams, and linear to take part in a QRP field event.*





*Photo B. The Oak Hills Research 100A single-band CW transceiver.*

adventures that far surpass the dreams of many others.

Born in 1949 in Syracuse NY, Marshall grew up knowing the importance of a good education. At a time when thousands of his contemporaries were being drafted to fight in Vietnam, Marshall dropped out of college and enlisted in the Air Force. After one and a half years of learning Russian, his linguistic duties had him operating as a "radio spy" in Athens, Greece. In 1973, he left the AF, got married, finished college, moved to Australia, helped to

raise three daughters, and started Milestone Technologies Pty Ltd. This is where he fell in love with CW operation quickly after getting his first license (VK2DXP). He had a small farm, which was named "Milestone" because there was a genuine old-fashioned milestone on the road with room for a V-Beam antenna. He discovered QRP for himself.

He and his family eventually moved back to the United States, choosing Denver CO, at the end of 1990. Five years later, in his search for the ultimate "dream key," he attempted to contact a mysterious Russian named "Larry," who sources claimed possessed a Soviet Russian paddle. Even though Marshall knew this was an excellent device, he really hoped there was some off-chance that he could procure a straight key. So, with an old QSL card in hand, phone calls were made to New York City. Sorry, no Larry — he had returned to Russia. A letter is mailed out — no response.

Now it is New Year's Eve, 1995, and Marshall, hugging groceries, walks to his car. A strange, bearded guy jumps out of the car parked next to his and runs over with his hand out. Marshall is thinking this must be a beggar, or at least a solicitation for funds.

"You're N1FN?" the strange man asks.

"Yes," replies Marshall.

"I'm Larry, WJ1R," says the man, and points to his license plate.

When Marshall's brain cells finally started to thaw, he realized that this was the same Larry he had earnestly sought six months previously.

Larry turned out to be a genuine ham radio VIP, having been president of the Soviet Amateur Radio Union, WRTC judge, and big-time DXer and contestor.

That day, in the middle of winter in the parking lot, Morse Express really took off. By 1999, Marshall's company was acknowledged as the largest seller of keys and related equipment in the world.

In an interview I had with Marshall, he provided some very interesting answers to questions regarding Oak Hills Research, CW, kits, and radio in general.

**KF6FJU:** How and when did you become the owner of Oak Hills Research?

**N1FN:** I love to build stuff, and I was particularly impressed by the Oak Hills Research kits, which have more than a passing comparability to the late, lamented Heathkits. I built many of the OHR kits, and was even a dealer for them for a while. When Dick Witzke KE8KL indicated a desire to sell the business and retire, I jumped at it. We acquired OHR in April 1999, and it is now a very important and rewarding part of Milestone Technologies.

**KF6FJU:** Did you view the acquisition of OHR as a dream come true?

**N1FN:** Sort of. I often tell people it was like the old Remington shaver ads — "I liked the kits so much, I bought the company." It's true that everybody who has ever built a kit has had ideas of how it could be better, and many of us builders dream of finding something that we could sell as a kit, if only to provide a little financial support for our own kit-building habits. But in this case of OHR, it was part of a larger dream, which has largely come true. I wanted to be in a position to provide every single thing that a ham or prospective ham needs to get on the air to become an active CW operator.



*Photo C. N1FN and his code-copying dog, Samson.*



**KF6FJU:** What has been your most humorous encounter as the owner of the company?

**N1FN:** Well, there was this one guy who I'm sure won't mind if he happens to see this. I spent half an hour with him on the phone trying to measure voltages as a kind of starting point. Partly it was my own stupidity at asking the wrong questions, or starting in the wrong place in the diagnosis, but I have to give my builders SOME credit, so I took him at his word that his radio would not transmit.

True, we fairly quickly got to the point where it was obvious that it wouldn't receive either, by looking for the required voltages at about a dozen points in the circuit. Eventually I had him measure the voltage on the inside of the power jack, and the end of the power cord, and then the voltage coming out of the power supply, when he asked me, "Should I turn the power supply on?"

I thought about it for a second and said, "No. What you need to do now is grab your soldering iron, your kit, and your amateur radio license, and go stand by the door. An FCC inspector will be there to confiscate them in about ten minutes."

This guy was OK with the sarcasm, and has gone on to be an active and skilled builder/operator.

**KF6FJU:** What is OHR working on right now?

**N1FN:** The kit business is pretty competitive, so I can't really say what we're working on. Suffice it to say that we will be developing the OHRI00A for more bands, and are working on a couple of very useful accessory kits.

**KF6FJU:** Tell me about ET. Are you really from outer space?

**N1FN:** Sometimes I think I must be. Or that everybody else is. But I came by the handle honestly. (By the way, "handle" is a perfectly good amateur radio term going back to the dawn of the hobby; it was adopted by CB users but is emphatically NOT one of the many CB slang terms that we need to avoid!). I operate DX frequently, and in contests. And, Marshall is not the easiest or quickest name for a ham radio operator. It seems to take forever to

send it, and I almost always have to repeat it. But, then one night I was in a nice ragchew QSO with an older gentleman in Florida, who was in fact so old that he was having difficulty controlling the key. My call sign at the time was AAØXI, and this old guy kept sending it as "ET ET Ø NAE." A friend happened to be sandbagging and started calling me ET. It sort of stuck, and I quickly realized that I could send ET three times faster than I could send "Marshall" once.

**KF6FJU:** What are your suggestions for the new ham?

**N1FN:** Have you seen the size of the ARRL Handbook lately? It contains MOST of my suggestions for the new ham. Seriously, the best advice that I can offer the new guy is to get on the air and OPERATE! Put down this magazine right now, and go work somebody. That's what this hobby is all about.

**KF6FJU:** If someone were to start a radio company today, what are the top three items you would advise them to prepare for in the business?

**N1FN:** In order: disappointment, disappointment, and success. Seriously, go to the local community college and take Business 101. A business is a business, and it doesn't matter whether it is a radio company or a potato company. There is a lot to running a business that is not apparent to somebody who hasn't tried to do it, and there are a lot of things that have to come together just right. The best advice

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**KF6FJU:** What is your opinion of hams today, compared to twenty years ago?

**N1FN:** That's kind of a loaded question, isn't it. The hobby certainly is changing, and in ways that I don't particularly care for. Ham radio for me is building a radio, an antenna, and talking to some guy on the other side of world (using CW of course) who has the same interests. But, for a majority now (in terms of simple numbers, anyhow), it's going to the local radio superstore or Internet site and buying an HT so they can use the repeater to talk to somebody on the other side of town who has the same interests. What a change, over twenty years or so ago. Unfortunately, while administration of the hobby has never been "majority rules," we are getting to the point where a majority of the administrators have come into the hobby through the easier and less technical routes, and those are the guys who make or influence policy and regulations.

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Guys (who) design and build stuff help each other. They talk to each other, have active clubs, and — most important — they operate. There is QRP FM, VHF, UHF, TV, RTTY, you name it. My local club, the Colorado QRP Club (CQC), set the all-time records for classes 2A and 3A in the last two Field Days, placing well into the Top Ten stations overall, with that arbitrary 5W of power. Let me just say that having an amateur radio license does not automatically make one a ham.

**KF6FJU:** Do you see your company as a modern Heathkit?

**N1FN:** Yes and no. There is actually a literal connection or two between Oak Hills Research and Heathkit. We use the same style of instruction (step by step, liberally illustrated), and the guy who drew for Heathkit did many of the drawings in our manuals. That's the yes. The no is that Heathkit ultimately failed, because it forgot rule number one and failed to define the business.

Electronics is just too big a field. Electronic manufacturing is so efficient now that almost every device can be sold at a price much lower than a kit of parts to make it from.

And then of course there is the support issue. So, you can only sell kits to people who see some benefit in doing the building themselves, or in other words, the building process is part of the fun, really a hobby in its own right. Our primary goal with OHR kits is to provide good, usable amateur radio equipment at reasonable cost, and the "kit building" is actually secondary to that. If Heathkit had stuck to that, rather than focusing on "teaching electronics and TV repair," they'd still be in business.

**KF6FJU:** What can you remember about your first radio shack and rig?

**N1FN:** Everything. Most especially, 40m was wall-to-wall Japanese stations. It was an FT-7, running off a tractor battery, and of course the famous Hi-Mound HK-708 that got the Morse Express ball rolling.

**KF6FJU:** What is the major difference between kits and factory-built radios?

**N1FN:** Essentially none, apart from application. We build OHR radios, and there's no difference between them and the kits. That's true of many of our other products. But, application comes into it because you are not going to find a Yaesu FT-1000D in kit form — you reach a point in price and complexity where a kit doesn't make sense. There is, of course, the "components issue," in that components with leads are becoming scarce, and surface mount technology is a bit beyond the curve for most hobbyists. But as I said, building a kit is an end in itself for many people, and there is the opportunity to learn a bit about the circuit while you're building it.

**KF6FJU:** Where do you see ham radio going in the future?

**N1FN:** I really hate to guess. I predict a good future for CW, and QRP HF, even if they become a relatively small part of the "official" hobby. The things that appeal about it are not going to change, and it's important to keep some perspective. They dropped the Novice license because in its last year there were fewer than a thousand of them issued. Less than a percent of licensed hams. That's how they looked at it, anyhow. I saw a thousand people who were coming into the hobby, and to me that's a lot of guys.

**KF6FJU:** What can the ham expect from Oak Hills Research?

**N1FN:** Easy-to-build kits for good, reliable equipment that they can have a lot of fun on the air with. All at a reasonable price, and with superb service and support, of course.

One of the best ways to find out more about Marshall Emm, OHR, or Morse Express is to check his Web out at: [http://www.morsex.com]. The Oak Hills address is Oak Hills Research, 2460 S. Moline Way, Aurora CO 80014; tel. 800-238-8205; E-mail: [qrp@ohr.com].

On the Web, you may even catch a glimpse of Marshall's dog, "Sammy," the only CW-receiving canine recorded to date (Photo C). Really, the dog can understand code. Marshall may have had the dog beamed down — "Hello, Scotty?"



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# Close Encounters of the 5R Kind

*Our Fearless Phil moseys out to Madagascar.*

The OH2MCN Web site [<http://www.qsl.net/oh2mcn/license.htm>] let me down this time. In the past, this site has been a source of extremely valuable information on obtaining a license in a country which Jan and I are planning to visit, but all that was listed at the time I first made enquiries in April 2000 was the address of the Ministere des Postes et Telecommunications in Antananarivo (Tana). Thankfully, this has now been considerably updated as a result of information provided from Ken Pendarvis AD6KA/5R8GQ.

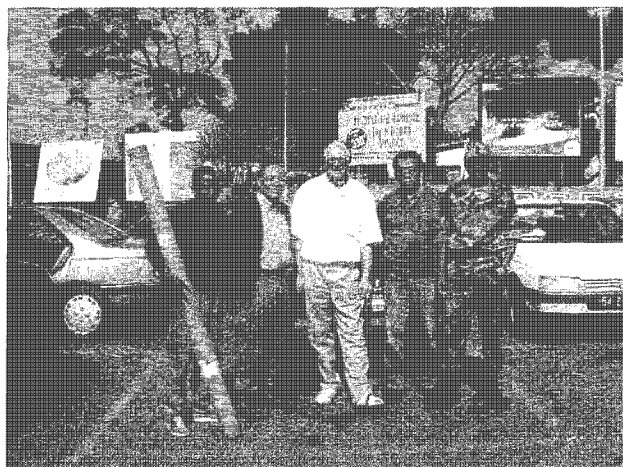
Our interest in visiting this strange and wonderful island was initially sparked by a newspaper item shortly after the 1999 total eclipse, which pointed out that the next total eclipse was not in 2090, but in Africa in June 2001, with the path of totality crossing the south of the country. Further research quickly revealed that the cost of visiting at the time of the eclipse was substantially higher than at other times, so we decided to

go in September instead. A copy of *The Lonely Planet* guide was duly purchased and we settled down to planning our itinerary. We also bought a French language tape to brush up on our linguistics while driving to and from work.

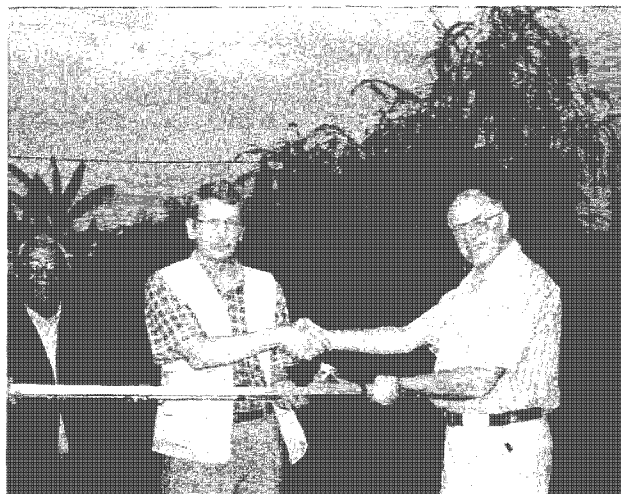
Madagascar is the fourth largest island in the world, lies in the Indian Ocean, and is separated from continental Africa by the 400-km-wide Mozambique Channel. The island itself is some 1,300 km long and some 400 km wide,

lying more or less between 12° and 26° south. When Gondwanaland, the world's biggest landmass, split into continents 165 million years ago, Madagascar was left behind and is now often described as "the land that time forgot." Madagascar's flora and fauna took a quite different evolutionary route than that of the rest of Africa, resulting in a huge number of unique

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**Photo A.** Arriving at the airport in Tana. L-R: Cortez' driver with the 6-meter antenna; Jean-Claude 5R8GO, Phil G3SWH, Solofo 5R8ET, and Fidy 5R8FV.



**Photo B.** Presenting the 6-meter antenna. L-R: Andreas 5R8FL, Ake 5R8FU, and Phil G3SWH.





**Photo C.** Suddenly I was QSL manager for several 5R stations!  
L-R: Eddy 5R8FT, Andreas 5R8FL, Phil G3SWH, Jean-Claude 5R8GO, and Albert 5R8GZ (ex-5R8O).



**Photo D.** The ring-tail lemurs at Berenty will help you with your breakfast.

## Close Encounters of the 5R Kind

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endemic species, probably the best known of which are the lemurs.

There are several tour operators in the UK who include Madagascar in their portfolio, but all are rather costly, even outside of eclipse time! Consequently, we decided to do our "own thing" once again and sent off a series of E-mails to those travel agents listed in the guidebook. One particular agent, Cortez Expeditions, responded with such efficiency and enthusiasm that we almost immediately started negotiations for our own tailor-made itinerary. We opted for our tested formula of a week's fairly intensive traveling and

a week relaxing on a beach, when I could play a bit of radio. We also found that if we booked our international flights on Air Madagascar — affectionately known as "Air Mad" — then all our internal flights would be heavily discounted. Flights were from Paris-Charles de Gaulle airport, so we cashed in some air miles and booked feeder flights from Bristol to Paris to make the connections.

When the revisions to the IOTA Directory were implemented in 2000, a new island group — "Madagascar's Coastal Islands East: AF-090" — was created and I noted that this included Nosy Bohara (a/k/a Ile Sainte Marie). The guidebook describes the island in glowing terms, and I proposed to Jan that we spend our beach time there,

hoping to be the first to activate the island group.

I also started to make enquiries about getting a license. A letter to the Ministère des Postes et Télécommunications in May 2000 actually elicited a response after a delay of several months, but I decided that I needed someone on the ground to help with the formalities. I had a couple of false starts but then a notice appeared in one of the DX bulletins announcing that Ken AD6KA was going to visit his sister in Tana during September 2000 and would be active as 5R8GQ. After a bit of detective work, I found an E-mail address and Ken put me in touch with Patrick 5R8EW, who agreed to help. Unfortunately, Patrick's health deteriorated and he was unable to



**Photo E.** One of the enchanting Verreaux's sifikas with her baby at Berenty.



**Photo F.** A brown lemur being handfed with bananas at Vakona.





*Photo G. Gigi, the black-and-white ruffed lemur at Vakona.*



*Photo H. Phil, resting his broken ankle while running the pile-up at Ile Sainte Marie.*

complete the arrangements and, in February 2001, with Ken's further help, I was put in touch with Solofo 5R8ET, who was efficiency itself.

Copies of the current application forms issued by the Office Malagasy d'Etudes et de Régulation de Telecommunications (OMERT) arrived promptly by E-mail, and were duly completed (in French) with help from Solofo. Copies of the forms, a copy of my UK license, a copy of the ICOM IC-706 specification, and four passport photographs were sent by DHL to Solofo in early April 2001. The actual license fee was 900,000 Malagasy francs (FMG) — about £90, which had to be transferred to Solofo by Western Union. With the DHL and Western Union fees, the actual cost of the license was around £150.

On 1st August 2001 I received an E-mail from Solofo informing me that my call was to be 5R8HA. I had asked for 5R8WH, but apparently OMERT will only issue callsigns in sequence.

Everything seemed to be organized, but then Murphy took a hand — or more accurately a foot — as I managed to break my left ankle three short weeks before we were due to leave.

Those three weeks were very uncomfortable, as I was in plaster from toe to knee, not a little pain, and couldn't drive. Much soul searching took place as to whether we would or would not travel. The French language practice also suffered a setback! The license was only valid for three months, and there was no possibility of rescheduling the flights within that period. I was able to walk with the help of a stick, and once I had proved I could struggle the 400 meters to my mother's and back again without collapsing, the decision was made. We would go!

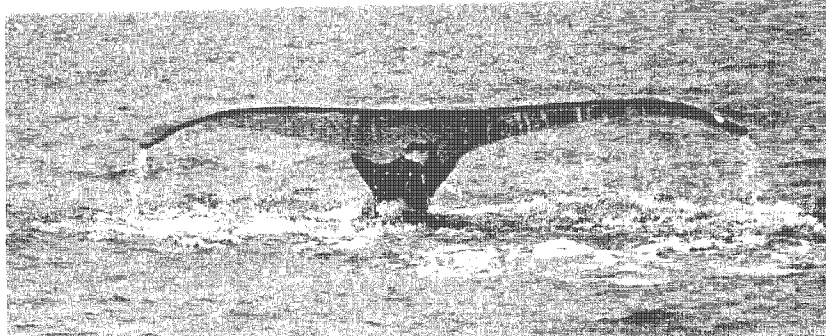
Kerry GØLCS also contacted me and asked if I would be prepared to take a six-meter beam with me as a gift from the UK Six Meter Group to Ake 5R8FU. The originally proposed antenna was over three meters long, which was clearly out of the question. However, an alternative was found that was shipped in an 1,800-mm-long tube, and we were able to cope with that. Fidy 5R8FV also asked if I could buy and take with me an SGC automatic ATU, for which he would pay me in Malagasy francs on arrival. Both items were provided by Mike G3SED at Nevada and were in addition to the

handful of components, gifts, etc., which we were taking for Solofo and his family.

5th September, the day of departure finally dawned, and the check-in clerk at Bristol Airport offered to book the bags through to Tana. Fearing a repeat of the lost baggage problems during our Sri Lankan trip, we declined and elected to manhandle them between the arrivals and departure areas at Paris-CDG. It wasn't until we got to Paris that we realized we had to change terminals via a shuttle bus. In view of my lack of mobility, we decided to take three small checked bags rather than the usual two large ones, plus hand luggage, camera bags and, of course, the six-meter antenna. Getting on and off the bus was somewhat difficult and we were afraid that the driver was going to leave us on the pavement with some of our bags still on the bus. As it happened, the only thing left behind was my walking stick!

The flight was uneventful, and we arrived at Ivato International airport in the early morning of 6th September. We joined the queue to pass through Immigration and struck up a conversation





*Photo I. A humpback whale tail off Ile Sainte Marie.*

with some sort of uniformed official. In exchange for a couple of dollar bills he took our passports, very efficiently jumped the queue, came back a few minutes later with them properly stamped and ushered us into the baggage reclaim area. It was here that Solofo had arranged for Fidy 5R8FV to meet us and deal with the formalities of temporarily importing the radio and computer equipment. Although we didn't know it until we arrived, Fidy is the general in charge of military communications within Madagascar and turned up dressed in his fatigues. He seemed to know everyone at the airport and we were very quickly through the Customs, where we were met by Solofo and Jean-Claude 5R8GO.

Our travel agent's driver also met us, and we set off for the 12-km drive into

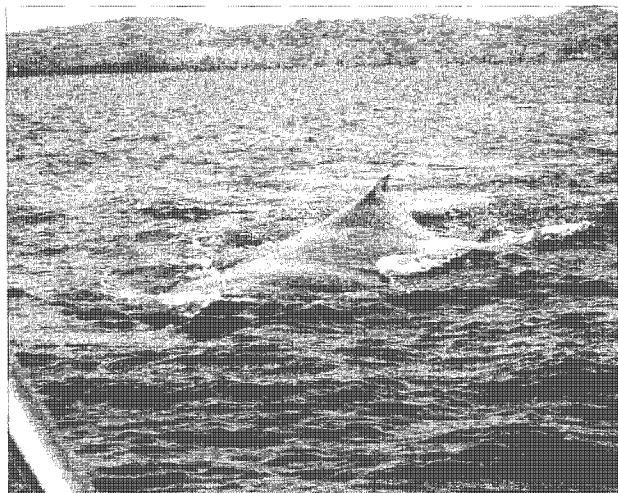
Tana itself. A typically third-world city of over a million people, it is polluted, chaotic, colorful, and most of all exciting. Thankfully, it is one of the only cities in the world without a McDonald's! The volume of traffic made the M25 on a bad day look positively sparse, and it took almost two hours to make the journey. There is only one set of traffic lights in the whole of Madagascar — and they were out of order!

Our hotel, the Royal Pallisandre, was on the side of a hill overlooking the city center. No sooner than we had settled in than the phone rang and it was Patrick 5R8EW calling to welcome us. His three-element beam was actually visible from the hotel balcony and under normal circumstances we could have walked down for an eyeball

QSO, but that involved negotiating a number of steps which I didn't feel confident in attempting with my leg still in plaster.

That afternoon, Solofo and his wife Irinée collected us and drove us to visit the Radio Nederland shortwave relay station where he works, about 20 km north-east of Tana. It was our first opportunity to see something of the countryside of the highlands with zebu-carts on the road and brightly colored houses, rice paddies, and beautiful flowering plants and trees alongside it. The relay station was first set up in 1971 and presently rebroadcasts Dutch programs for 17 hours per day via two 300 kW AM transmitters to listeners in Africa, the Middle East, and South East Asia, as well as to Indonesia and west Australia. The programs themselves are received via a satellite link from Hilversum in the Netherlands.

The following morning, Solofo collected us and took us to OMERT to have the IC-706 checked over for spurious emissions, using surprisingly sophisticated test equipment, prior to actually issuing the license. This was the primary reason for the high cost of the actual license, although the cynic in me suspected an opportunity to earn some foreign currency. The radio passed with flying colors, but the license document itself was still awaiting signature by a senior official. Solofo arranged to collect it on my behalf and give it to me at the airport when we left.



*Photo J. The humpback whales that swam under the boat.*



*Photo K. The black-and-white ruffed lemurs at Les Lemuriens on the Ile aux Nattes will drink your Coke from your glass!*





**Photo L.** *The Indri at the Bush House reserve.*

That evening, Solofo and his XYL Irinée hosted a small party at their house, to which were invited most of the amateurs in Tana, including Ake 5R8FU; Albert, ex-5R8O and now 5R8GZ; Andreas 5R8FL; Eddy 5R8FT; and Jean-Claude 5R8GO and Fidy 5R8FV, together with their XYLs. I was able to present the six-meter antenna to Ake and the ATU to Fidy and he introduced to the local brew, called "Three Horses Beer" — impossible for the Malagasy to pronounce and consequently called "THB" for short. Conversation naturally revolved around amateur radio in general, and in particular the problems of sending and receiving QSL cards in Madagascar, where both incoming and outgoing mail theft is particularly

prevalent. Several of the guys backed me into a corner, and suddenly I was the QSL manager for six 5R callsigns!

The following morning was the start of our tour proper, and we were driven from the hotel to the airport to take the plane to Fort Dauphin (Taolagnaro) in the dry, arid south, via Tulear (Toliara). Most of the old French place names have been replaced by their Malagasy equivalents, but some are still retained. There were no seat allocations and the in-flight refreshments consisted of a glass of Coke and a packet of biscuits. On arrival we were met by our driver Sylvester, and English speaking guide Dodi, in a four-wheel-drive Suzuki jeep. We set off for the two-hour, 80-km drive inland to the Berenty Private Reserve, where we were to stay for two nights. The road surface was appalling and Dodi explained that it had not been repaired since it was first laid in 1956. En route, we passed through the so-called "spiny forest" made up of several species of plants and trees able to survive in the extremely arid environment. Berenty itself is justifiably famous for its wildlife with many species present, including ring-tailed and brown lemurs. We were particularly delighted to see several of the enchanting Verreaux's sifakas: large, creamy-white lemurs with brown caps and black faces, who spend most of their time in the trees of the spiny forest. When they do come down to earth, they dance their way across the open ground on

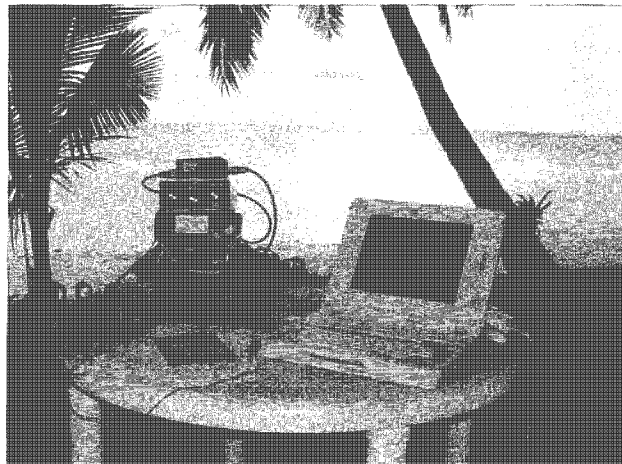
two legs in the most comical manner. Accommodation was in a simple shack with twin beds, mosquito nets, a shower, and WC. Dire warnings are given not to let the ring-tails into your room, although preventing them from helping themselves to your breakfast was a little more difficult! The weather was glorious and the stars at night had to be seen to be believed.

Returning to Tana for another night at the Palissandre, we again met Solofo and Irinée for an evening meal. Next morning, a new driver, Frank, collected us for the three-hour drive east from Tana to the Andasibe National Park in the eastern rain forest, where we were to stay for two nights at the luxurious Vakona Forest Lodge. Our route followed the Chinese-built Route Nationale RN2, between Tana and the port of Toamasina (Tamatave) on the coast, which the Foreign Office Web site describes as "particularly dangerous." Frank spoke little or no English, so our French studies were put severely to the test. He was a competent enough driver and got us there safely in time for a late lunch, although we did see several trucks with their loads in the ditch and, on one occasion, a truck in the ravine alongside the road.

That evening we were scheduled for a night walk with a guide, but it was raining, and the track steep, muddy, and slippery, which was soon agreed to be a bad combination for a man with a leg in plaster. Early next morning the



**Photo M.** *Phil operating from AF-090 as 5R89HA.*



**Photo N.** *The setup and takeoff to the northwest from the Soanambo Hotel.*



weather was better and we met up with our English-speaking guide Désiré to search in the Périnet Reserve for the largest of the lemurs, the Indri. Standing about a meter tall with almost no tail, black-and-white markings, and a surprised teddy bear face, it is their song that makes the Indri special. It is an eerie, wailing sound, somewhere between the song of a whale and a police siren that carries for up to three kilometers. We were delighted to find a small family in the thick woods who put on a spectacular performance for us.

That afternoon, we visited Lemur Island, a small reserve operated by the Vakona Forest Lodge. Here we were introduced to Gigi, a very friendly black-and-white ruffed lemur whom we were able to feed with bananas before being jumped on and clambered over by several other species of lemurs while being warned not to stroke them.

That evening when we went to the bar for a predinner drink, a very somber Frank greeted us with the news of an aircraft having crashed into the Pentagon. It was September 11, and we could barely believe the pictures on the satellite TV, which was somehow made all the worse as the soundtrack was in French. Whilst it was clear that terrible events were taking place, we could not fully understand the gravity as few people spoke enough English to explain what was happening and neither was our French good enough. It wasn't until we arrived home that we fully understood the horror of what had happened that day.

Next morning we checked out and Frank drove us down to the coast near Brickaville, where we made a rendezvous with a speedboat to carry us along the Canal des Pangalenes to Bush House on Lake Ampitabe for the next two nights. The Pangalenes are a 600-km chain of natural lakes and canals created in French colonial times, with only 100 meters or so of land separating them from the Indian Ocean. We were greeted on the jetty by Bambino, a Malagasy man who spoke excellent English as well as French, German, and Italian. After Vakona, Bush House was basic but comfortable with our own bungalow overlooking

the lake. The mosquito net wouldn't close properly around the bed and there was no evidence of the nasty creatures, although we did wake one morning to find a palm-sized golden orb-web spider on the inside of the net. The bar and restaurant were reached via a steep, beaten-earth stairway but the excellent food made the climb well worth it! There was even a pet bamboo lemur named Sugar Baby.

Bush House has its own private reserve a short distance along the beach. There are various species of introduced lemurs, including a few hybrids. Although they are free-ranging, they are tame enough to be photographed and will clamber all over you looking for bananas. The highlight was for the guide, Sylvain to imitate the song of the Indri and for the resident to come out of the forest to join in.

We were joined next morning by a Belgian couple for our journey along the Pangalenes to Tamatave, where we were met by a girl in a tiny Renault 5, who was to take us to the airport for our flight to Ile Sainte Marie. Unfortunately, the Belgians had no prearranged transport and none was available, so all four of us, together with our bags, crammed into the car. I was lucky to get the front seat because of my broken ankle! We have since become very firm friends! Solofo had tried to arrange for Michel 5R8EE to meet us at the airport, but he failed to show up. The aircraft was a Twin Otter, and each passenger was carefully weighed in addition to every item of luggage.

My plans to be the first to activate the AF-090 group were confounded as Sigi DJ4TJ/5R8GT/P, Bert PA3GIO/5R8GY and Jacques F6BUM/5R8HC all beat me to it. Strangely, all three operated from the Hotel La Cocoteraie on the northern tip of Sainte Marie. Described as the most isolated of the island's hotels, it is only 40 km from the airport — but such is the state of the island's roads that it takes 2.5 hours to get there! Electricity is available only from generators or batteries.

Arriving at the island's airport, we were met by a minibus from the Soanambo Hotel. Our Belgian friends went on to another hotel nearer the

capital, Ambodifotatra. We had elected to stay at the Hotel Soanambo, because it has mains electricity and is only about a 10-minute drive from the airport, overlooking the 8-km-wide strait between the island's west coast and the mainland.

Our room was on the ground floor of a two-story house — literally three meters from the high tide mark — and the beach was lined with conveniently placed palm trees. Even with my leg in plaster, it was a simple job to throw a weighted string over a couple of trees and to rig the antenna facing northwest at about 5 meters above the beach. This trip, I followed Alan G3XAQ's suggestion of a 16-meter top, fed with 300-ohm line via an ATU, but had a selection of wire dipoles and lengths of coax in my bag — just in case. I need not have worried, as the single antenna tuned happily on all bands and worked tremendously well, particularly on 10 meters.

With the station set up on the patio outside the room, the first QSO was with F6ACV on 17-meter CW at 1418 UTC on 15th September and a pile-up quickly developed. I had made the mistake of being too keen to get on the air and had not properly set up the IC-706 for split working, which takes a minute or so. Consequently, this first period of activity was run simplex, but even so I made 134 QSOs in a little less than two hours before the dreaded call from Jan of "time to get ready for dinner."

Next day, I concentrated on 10 meters and had a couple of very good sessions, bringing the QSO total to 448. More sightseeing, including an unforgettable day at sea watching humpback whales cavorting in the strait, interrupted radio activities. At one stage, two of the huge creatures swam straight at our tiny boat, at the last moment diving to pass directly below it.

We also hired a pirogue (effectively a dugout canoe) to take us across to the small island of Ile aux Nattes (Nosy Nato) off the southern tip of the main island. Apart from lunch at the highly recommended restaurant of the Hotel

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# What's in a Name?

*Badge, that is? A cabin fever cure-all.*

*April 5th and 6th were the dates for "Atlanticon 2002" in Baltimore, Maryland, and let me tell you, it was nothing short of terrific! I've helped organize events for our club in the past, but never so grand an event as this. My hat is off to those members of the New Jersey QRP Club who poured their efforts into making this event the success that it was.*

Let me start from the start. Having attended "Atlanticon" before, I sort of knew what to expect, but this one was way beyond my visions. The event is planned to cover a weekend in the spring, from Friday evening until pleasant good-byes on Sunday morning. Not being one who likes to drive when tired, a strange illness came over me at work on Friday. Naturally, I "cashed in" some of my "sick time" halfway through the workday and headed out. Somehow I don't think the boss really believed me — maybe it was the suitcase in the car that tipped him off. Oh, well, no matter. I was free from the shackles and was off to join the others in Maryland.

From my QTH (on the Hudson River by West Point) it was a six-hour drive to the hotel and check-in. I knew that I was in the right place because of all the mobile whips on the vehicles in the parking lot. My excitement, already at a fevered pitch, gained another notch. I tossed the bags in the room and began looking for other QRP-building hams to "bond" with, and I didn't have to look very far!

Those who knew that they would be in attendance had registered early and received a yellow "Badger" in the mail (see **Photo A**). This device is a name and callsign clip-on badge, but it also has a

powered microprocessor circuit board, double-sided, attached to the reverse side. And, it was already programmed! (See **Photo B**.) Push the button on the front, and it sends your callsign in Morse and a bright LED flashes it at the same time! Neat! There was some "assembly required" and work stations were there for your use.

I'm not very good at staying up late after driving and working, so I made my way to my room after chatting for a few hours with some folks I remembered from past events.

Saturday morning arrived and the fun began!

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**Photo A.** The FRONT side of the badge, with its blinking LED, push-button, and piezo buzzer mounted in the "Badger." Your "chore" was cutting the holes to expose the buzzer, switch, and LED.



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## What's in a Name?

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Rich Arland K7SZ, master of ceremonies, promptly launched the event in a seemingly endless parade of topics that interest QRP builders most. From Joe Everhart N2CX with his presentation on "SPICE" (computer modeling of circuits) to Dave Benson K1SWL (dialog on antennas and EZNEC modeling of them), the enthusiasm never stopped. Between these two were Dave Gauding NFØR, with a modified DSW-40 transceiver; Jim Kortge K8IQY, measuring crystal parameters and how to use them; Paul Harden N4SN, impedance matching and transmitter design; and Ron Polityka WB3AAL, with "a tell-all" about QRPing along the trail. He hikes with a QRP rig and solar panel or battery attached to his anatomy!

Not a sound could be heard from the 150 or so attendees as each of these speakers made their presentations.

Stretch and coffee breaks were provided between speakers, but you didn't dare go too far! There were "door prize" drawings between events. LOTS OF THEM! The list of donors is too long to present here, but the generosity of the supporting groups was overwhelming!

Following the break for dinner, the evening festivities began with a surprise!

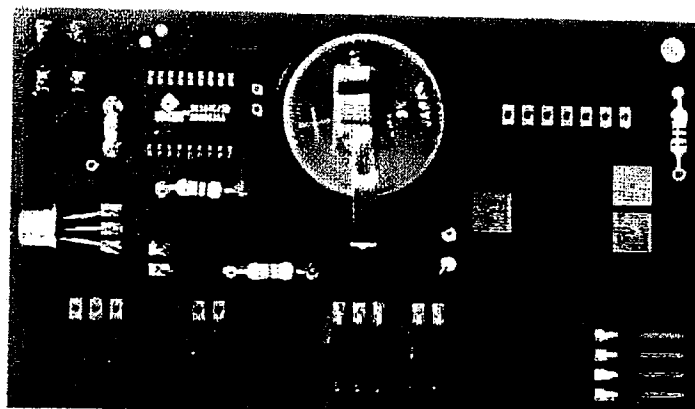
Those "Badger" identification badges were programmed with "hidden clues." Some had a number/letter combination, others just a number. The object was to copy the clue from another's badge in Morse, add the data to your "fill in" sheet and complete the quote selected for the contest. You haven't heard QRM until you've heard 150 Morse-generating badges all going off at once!

To compete required that you circulate amongst the throng, gathering information from each attendee and giving your data in return! Now add the bright flashing LED to the clamor and perhaps you can imagine what it was like! BEDLAM!!! With prizes for the winners. Check the Web site [<http://www.njqr.org>] for badger circuit details. There is also an article about them in the May 2002 issue of *QRP Quarterly*.

Last but far from least, Saturday evening is the "Building Contest." This is an eagerly awaited event for builders of all abilities to show off their endeavors for all to see. There are no rules, per se — just build to the best of your abilities and share your creation with the group. From the newest builder's doodad to the most competent engineered device, all were outstanding creations. Prizes were awarded in several categories, from the inexperienced builder entry class upward. It was very pleasing to see judges reward those who build with exemplary skill and then reward the new builder whose efforts were also recognized.

Photographs of home-brew equipment usually are placed on the Web site [<http://www.njqr.org>]. For those of you who weren't in attendance, this is a great place to view other's handiwork and gain ideas for projects of your own. A more in-depth accounting of the event is there, complete with pictures of the projects in the building contest and the winners of various prizes.

Oh, well, my eagerly awaited Atlanticon Forum had to come to an end sometime! Now for that drive to the home QTH and work as usual in the morning. But you know, I'll bet that strange illness will in all probability repeat itself — next year! (You can count on it!) 73



**Photo B.** The "business side," or actually the rear or far side of the circuit board. Here three resistors, a capacitor, battery holder, and semiconductor had to be placed and soldered. The surface mount device was mounted for us. The other side of the board holds the LED, switch, and buzzer. This is the "give you the business" side of the board!



# Letter From the Other Side

*Re: Celebrating the bisesquicentennial of a shocking event.*

*This item from The Hertzian Herald is published to commemorate the 250th anniversary of the first practical application of electricity (Franklin's lightning rod, June–October 1752, depending on how you see it).*

At age 21, I was just trying to establish myself as a respectable young man, so I felt like a perfect fool, running around out there in that field. I knew that if anyone saw me I would have a great deal of explaining to do. And, indeed, for years afterward the pulpits around Philadelphia rang with the warning that only Satan himself could have concocted such a scheme as to poke pointed metal sticks up into God's heaven, literally daring Him to send lightning bolts down to destroy us.

The gusting wind spun the kite in dizzy circles each time I tossed it into the air, and I considered it fortunate that the sharp wire point Father had attached to the top of it buried itself in the ground each time it landed, rather than into my head or shoulders. Finally, as the rain started to fall and the wind steadied, I got enough tail on it to keep it stable, and it rose into the lowering clouds.

Father was seated in a shed at the

edge of the field, safe from the rain and the eyes of curious neighbors, paying out the hempen string through a window. He had to remain "insulated," he said. He wouldn't touch the wet string, but only held a dry silk handkerchief he had tied to the end of it. After some time sparks began to jump from the end of a large iron key he had also tied to the end of the moist string. He then touched an electroscope to the key, and the leaves inside the glass vial floated apart.

"That clinches it, William," he said. "Lightning and electricity are one!"

Father had been experimenting with electricity since 1746, generating great sparks by rubbing a rapidly rotating glass sphere, and igniting spirituous fumes, and tingling folks with "electric shocks," which I found quite disagreeable. On several occasions he deliberately killed turkeys with these shocks, and at least once he very nearly killed a goose — himself — knocking himself quite senseless. He claimed to have ignited a flame by an electric discharge sent across a river, using the river water as the conductive medium — a feat which I never witnessed, but if true, it anticipated Morse's telegraph

by nearly 90 years, and Marconi's wireless by some 140.

In 1750, electricity was thought to consist of two fluids: vitreous (obtained by rubbing glass) and resinous (from rubbing rosin). Father first proposed that it was a single fluid, flowing between two poles that he named positive and negative. He was also the first to connect electric sources in series, which he called a battery.

After the success of the kite experiment, Father knew exactly what to do. He recognized that the clouds and the Earth were the two plates of an enormous Leyden jar (a capacitor, I believe you call it in 2002), and he proposed to discharge it in the usual way, only on a much larger scale. In October his newspaper, the *Pennsylvania Gazette*, carried complete directions for performing the experiment — carefully phrased in the passive voice (a kite is to be made) to avoid revealing that he himself had done it. That same issue carried an advertisement for the new edition of his *Poor Richard's Almanac*, which in turn contained similarly worded instructions for constructing a grounded lightning rod, with confident



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# Saving the Fleet

*Of batteries, that is.*

*It is interesting to observe that batteries cared for by a single user generally last longer than those operating in an open fleet system where everyone has access to them, but no one is accountable for them.*

In this article, we look at two distinct battery users — the personal user and the fleet operator — and provide suggestions for prolonging battery life and increasing reliability in the rather harsh environment of fleet use.

A personal user is one who operates a mobile phone, a laptop, or a video

camera for business or pleasure. He or she will likely follow the recommended guidelines in caring for the battery. The user will get to know the irregularities of the battery. When the runtime gets low, the battery will get serviced or replaced. Critical failures are rare, because the owner adjusts to the performance of the battery and lowers expectations as the battery ages.

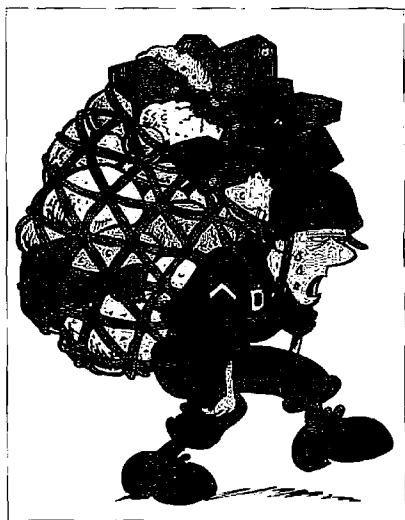
The fleet user, on the other hand, has little personal interest in the battery and is unlikely to tolerate a pack that is less than perfect. He simply grabs a battery from the charger and expects it to last through the shift. The battery is returned to the charger at the end of the day, ready for the next person. Perhaps due to neglect, fleet batteries generally provide a shorter service life than those in personal use.

How can fleet batteries be made to last longer? An interesting observation can be made by comparing the practices of the U.S. Army and the Dutch Army, both of which use fleet batteries. The U.S. Army issues batteries with no maintenance program in place. If the battery fails, another pack is released, no questions asked. Little or no care is given, and the failure rate is high.

The Dutch Army, on the other hand, has moved away from the open fleet system by making the soldiers responsible for their own batteries. This change was made in an attempt to reduce operational costs and improve reliability. The batteries are issued to the soldiers and they become part of their personal belongings. The results are startling. Since the Dutch Army adopted this new regime, the failure rate has dropped considerably; at the same time, battery performance has increased. Unexpected downtime has almost been eliminated.

It should be noted that the Dutch Army uses NiCd batteries exclusively. Each pack receives periodic maintenance on a Cadex battery analyzer to prolong service life. Batteries that do not meet the 80 percent target capacity setting are reconditioned; those that fail to meet the target setting are replaced.

The U.S. Army, on the other hand, uses NiMH batteries, which are known to have a shorter service life. The army is evaluating the Li-ion polymer for the next-generation battery.



**Photo A.** Results of battery neglect. The soldier is carrying rocks instead of batteries. Maintenance helps to keep deadwood out of military arsenal. (Cadex Electronics, Inc.)



## Battery analyzers for critical missions

The high failure rate of fleet batteries, excessive replacement costs, and poor reliability have prompted many organizations to service rechargeable batteries with a battery analyzer on a regular basis. Today, battery analyzers play a critical role in prolonging battery life and maintaining a healthy battery fleet.

Conventional wisdom says that a new battery always performs flawlessly, yet many users realize that a fresh battery may not always meet the manufacturer's specifications. With a battery analyzer, weak batteries can be identified and primed. If the capacity does not improve, the packs can be returned to the vendor for warranty replacement. Entire batches of new batteries have been sent back because of unacceptable performance. Had these batteries been released without prior inspection, the whole system would have been jeopardized, resulting in unpredictable performance and frequent downtime.

In addition to getting new batteries field-ready, battery analyzers perform the important function of restoring weak batteries and weeding out the "dead wood." Weak batteries can often hide among their peers. But when the system is put to the test in an emergency, these nonperformers stick out like a sore thumb. It should be noted that battery analyzers are most effective in restoring nickel-based batteries. Lithium-based batteries lose capacity mostly due to aging, and such performance loss is nonreversible.

Organizations tend to postpone battery maintenance until a crisis situation develops. One fire brigade using two-way radios experienced chronic communication problems, especially during callouts lasting more than two hours. Although their radios functioned in the receive mode, they were not able to transmit, and firefighters were left unaware that their calls did not get through.

The fire brigade acquired a Cadex battery analyzer and all batteries were serviced through exercise and reconditioning methods. Those batteries that

did not recover to a preset target capacity were replaced.

Shortly thereafter, the firefighters were summoned to a ten-hour call that demanded heavy radio traffic. To their astonishment, none of the two-way radios failed. The success of this flawless operation was credited to the excellent performance of their batteries. The following day, the captain of the fire brigade personally contacted the manufacturer of the battery analyzer and enthusiastically endorsed the use of the device.

Batteries placed on prolonged standby commonly fail when needed in an emergency. A Cadex representative was allowed to view the State Emergency Management Facility of a large U.S. city. In the fortified underground bunker, over one thousand batteries were kept in chargers. The green lights glowed, indicating that the batteries were ready at a moment's notice. The officer in charge stood erect and confidently said, "We are prepared for any emergency."

The representative then asked the officer to hand over a battery from the charger to check the state of health. Within seconds, the battery analyzer detected a fail condition. In an effort to make good, the officer grabbed another battery from the charger bank, but it failed, too. Subsequent batteries tested also failed.

Scenarios such as these are common. Political hurdles and lack of funding often make it difficult to solve such problems quickly. A maintenance program in which each battery is cycled on a monthly basis with a battery analyzer would prevent such a problem. In the meantime, the only thing the officer of the emergency facility can do is pray that no emergency will occur.

Another user group that relies heavily on batteries is the military. Defense organizations take great pride in employing the highest-quality and best-performing equipment. When it comes to rechargeable batteries, however, there are exceptions. The battery often escapes the scrutiny of a full military inspection and only its visual appearance is checked. Maintenance

requirements are frequently ignored. Little effort is made in keeping track of the battery's state of health, cycle count, and age. Eventually, weak batteries get mixed with new ones and the system becomes unreliable. As a result, soldiers are carrying rocks instead of batteries. A battery maintenance program with battery analyzers keeps deadwood out of the arsenal.

## Summary

Unlike individual battery users who know their batteries like a good friend, fleet users must share the batteries from a pool of unknown supply. While an individual user can detect even a slight reduction in runtime, fleet operators have no way of knowing the behavior or condition of the battery when pulling it from the charger. They are at the mercy of the battery. It's almost like playing Russian roulette.

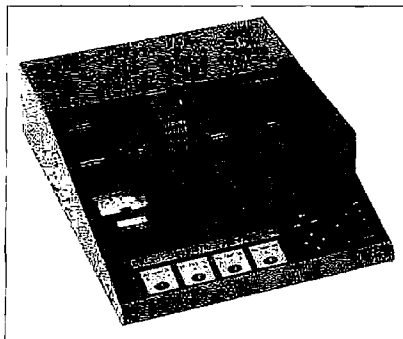
Increasingly, fleet battery users are setting up battery maintenance programs. Such a plan exercises all batteries on a regular basis, reconditions those that fall below a set target capacity, and "weeds out" the dead wood.

Usually, batteries get serviced only when they no longer hold a charge or when the equipment is sent in for repair. As a result, battery-operated equipment becomes unreliable and battery-related failures occur too often. The loss of adequate battery power is as detrimental as any other malfunction in the system.

## Cadex 7400 battery analyzer

The Cadex 7400 services NiCd,

*Continued on page 55*



**Photo B.** Cadex 7400 battery analyzer.



# The History of Ham Radio

## Part 13 — Birth of the Wouff Hong.

*On the lighter side of amateur radio, during the long winter nights there evolved within the fraternity a new phase of activity. It had its inception in the many curious, humorous, and indescribable stories under the pen name of The Old Man who now, through the lapse of time, has become a hallowed legend. The legend is now permanently memorialized in the Wouff Hong Story.*

According to research, the ever-present references to the fabulous Wouff Hong came about like this:

In the days when amateur radio was in swaddling clothes, way back in about 1914, there emerged a personality known as the Old Man.

### *The Old Man*

As reality would have it, this individual was, as all amateurs were and are to this day, afflicted with the sad but ever-present problem of raucous disturbances, be they man-made, nature-made, or even fabricated right within the shack of the beholder. This perpetual problem was known in the days of yore as "Rotten QRM." But to go on with the research.

Plagued in the very early days of wireless communication with such interference, driving sane but determined

listeners (wishing to remain that way) to distraction, especially when the headphones were securely clamped over both ears, listening intently for what the Morse dots and dashes were meant to convey, there emerged the following effusive but clear and loud verbiage into print [the Old Man exclaiming]:

"Fellows [all excited and boiling over], fellows, this QRM business is getting my nanny — here it is midnight — I have smoked myself into a state of funk — the floor is covered with burnt matches — I am losing a perfectly good temper — there is no sign this will not continue all night long ... How long do the radio bugs sit up at night anyway? — What are we

going to do about this business? — When we heard some commercial station say QRM we had to look it up on the chart to see what it meant — Later we began talking to the fellow over on the other side of town, and then was born our amateur QRM.

"But when we have a fellow who has not written to his girl for a full twenty-four hours, and who positively must get the message to her over in Illinois, it becomes a serious matter to have someone else getting gay with the ether, especially when the latter has no conception of the existence of the word 'brevity.' The trouble is, the young squirts don't stop to think. Willy with his sputtering spark coil

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QST

January, 1917

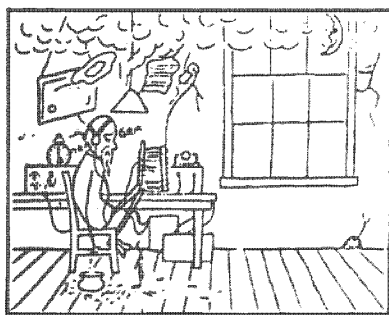
### Rotten QRM

By "The Old Man."

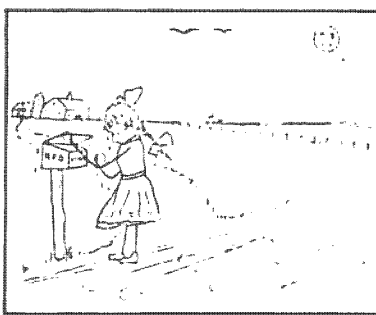
Say, fellows, here's the old man again. This time he's all excited and boiling over. In fact he's so wild about some "Rotten" subject that he has fallen back to some queer dialect and shouts about "wouff hong's", "rettysnitches", and some disorder known to the trade as "ugerumf". What do all these mean? Better read the article and see.  
—Editor.

Fig. 1. Rotten QRM.

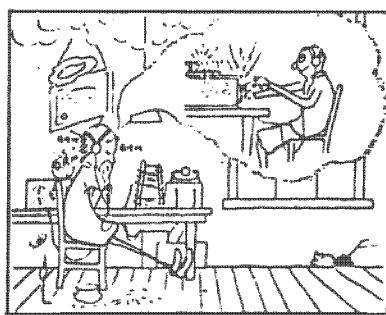




Smoked himself into a state of funk.



Poor girl in Ill. who hasn't heard from her fellow in 24 hours.



Rubber band—Commercial tone.

Fig. 2. Three cartoon illustrations.

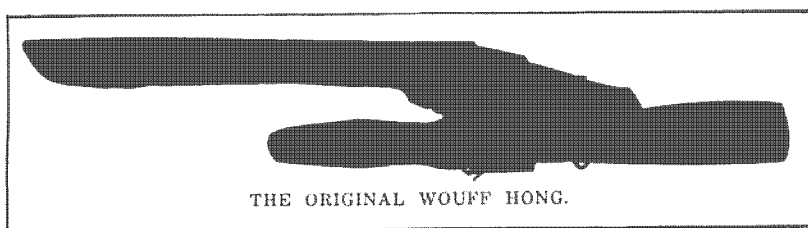


Fig. 3. The original Wouff Hong.

discharge sends out this hogwash — now listen to this ...

“Yes yes jst wyd glucky wait a mt muddy wouff hong bliftsky monkey motor.” We assume from this message that Glucky is being asked to wait a minute while Bliftsky seeks a wouff

hong with which to wallop a monkey the next time the latter faces towards the motor. I do not think I know just exactly what a wouff hong is. Probably some piece of apparatus used in the southern states to beat monkeys with.

“It is this form of uninteresting ‘conversation’ which clutters up the air with QRM. Of what moment is it to the rest of the world that this fellow Bliftsky is going to smear somebody’s monkey with a wouff hong? When anybody relapses into such a mental slop as to want to operate with a thing named a wouff hong, he ought to keep his trouble to himself and not compel all of us respectable amateurs to listen to his drool. To slave and slobber a lot of foolish twaddle like this when that poor girl in Illinois has not had a letter since yesterday is plain wicked.

“Or just cast a lingering look at this:

*Continued on page 55*



Photo A. Three Wouff Hongs decorate a ham shack.

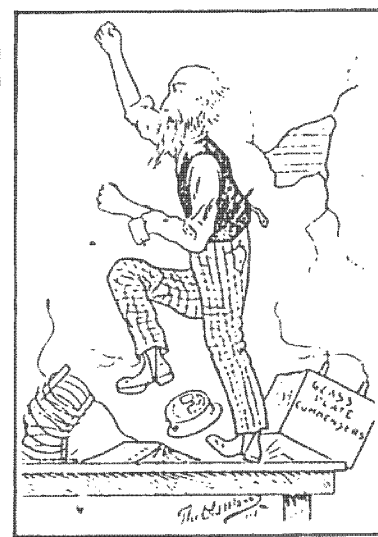


Fig. 4. WELL! WELL! WELL! LOOK WHO'S HERE. A picture of THE OLD MAN. It came in the mail, just like all his stories.



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the January issue, we should receive it by October 31. Provide a clear, concise summary of the essential details about your Calendar Event.*

## OCT 5

**WARSAW, MO** The Twin Lakes ARC will sponsor the Warsaw MO Hamfest Saturday, October 5th from 9 a.m. to 4 p.m., at the Warsaw Community Bldg., one block west of the square. Talk-in on 147.300 on the Warsaw rpt. Setup is at 5:30 a.m. Admission \$2 at the gate. 8 ft. tables \$10 each (hurry, only 30 available). Breakfast and lunch will be served on site. For more info call Gene at 660-438-8650, or E-mail to [gpo@advertisenet.com](mailto:gpo@advertisenet.com).

## OCT 6

**MEDINA, OH** The Medina Two Meter Group will present the Medina Hamfest at the Medina County Career Center, 1101 W. Liberty St. (State Route 18) Medina OH 44256. This location is just 3 miles west on Route 18 from downtown Medina. Talk-in on 147.030(+). All indoor tables and spaces. Computer equipment, new and used ham gear, ARRL approved. Advance vendors tables \$9 each (includes one admission ticket per table). Inside flea market space (includes one admission ticket per space) \$7 each in advance. One flea market space is enough room for one 8 ft. table. Two spaces would equal 16 feet. Advance reservations must be received by 09/29/02. An SASE is required for return of tickets. All tables will be held until 9 a.m. the day of the show. Let us know if you have any personal requests. Please send your remittance to the *Medina Hamfest Committee*, P.O. Box 452, Medina OH 44258. Visit [www.qsl.net/m2m](http://www.qsl.net/m2m) for more information. For general questions about the hamfest contact Mike N8TZY at 330-273-1519 after 7 p.m., or E-mail [n8tzy@m3net.net](mailto:n8tzy@m3net.net). For VE exam info call Fred K8FH at 440-236-3477. Walk-ins are always welcome. Testing starts at 9 a.m.

## OCT 12

**BREMERTON, WA** On Oct. 12th, 9 a.m. to 3 p.m., the North Kitsap ARC will host a Hamfest at President's Hall, Kitsap County Fair Grounds, NW corner of Fairgrounds Rd. at Nels Nelson Rd. Talk-in on 146.62(-) PL 103.5 WWRA rpt., or 146.53 simplex. Admission \$5, 12 and under admitted free. New and used equipment. Tables \$15 each (and one free admission) until 09/30/02; \$20 each afterwards. Helpers for renters of personal tables (2 max) \$4 each. Commercial spaces \$30. Electrical power \$2 per table. Contact

Russ Swank K17PG, P.O. Box 2268, Silverdale WA 98383-2268. Phone 360-697-6451, or E-mail to [nkarc@yahoo.com](mailto:nkarc@yahoo.com). Info available at [www.silverlink.net/nkarc](http://www.silverlink.net/nkarc).

**LAKE PLACID, NY** The Northern New York Section Hamfest and Convention will be held at the Horse-Show Grounds on Route 73, adjacent to the Lake Placid Airport, Lake Placid NY. This ARRL Sanctioned event will be sponsored by the Amateur Radio Clubs of the Northern New York ARA. Vendor tables are \$9, including one admission. Additional vendor staff is \$2.50 per person. Free coffee or soft-drinks with vendor ID badge. For vendor reservations and advance tickets, contact Tom Valosin WB2KLD, 117 Warrior Way, Middleburgh NY 12122. Phone 518-827-4800 or E-mail [valosin@midtel.net](mailto:valosin@midtel.net). Visit the NNYARA Web site at <http://www.geocities.com/nyyara>.

**WASHINGTON TOWNSHIP, NJ** The Bergen ARA will sponsor its Annual Fall Hamfest on Saturday October 12th, at the Westwood Regional Jr./Sr. High School, 701 Ridgewood Rd., Washington Township NJ. This is approximately 15 minutes from the GW Bridge and 5 minutes from Paramus NJ. Vendors arrive at 6 a.m. General admission 8 a.m. to 2 p.m. VE exams 8 a.m. to 10 a.m. only. DXCC card checking. Rain or shine. Indoor and outdoor spaces. Lots of parking for tailgating. Admission is \$5 donation (non-ham family members free), and vendors \$10 per space. Rest room facilities and refreshments available. For more information check the BARA Web site at [www.bara.org](http://www.bara.org), or contact Jim Joyce K2ZO at [K2ZO@arrrl.net](mailto:K2ZO@arrrl.net) or 201-664-6725. Talk-in on 146.19/79.

## OCT 13

**EAST LANSING, MI** The Lansing Civil Defense Repeater Assn. and the Central Michigan ARC will sponsor a hamfair, 8 a.m. to 1 p.m. October 13th, at Lakeside Christian School, 7868 M78 Hwy., East Lansing MI. Admission \$5 at the door. Trunk sales \$10. Tables \$12. Vendor setup at 5 a.m. Talk-in on 145.390(-) 100 Hz PL, and 146.520. Contact Mike Rhew KC8DBP, 989-725-1853, or E-mail [kc8dbp@arrrl.net](mailto:kc8dbp@arrrl.net). For info about VE exams, call 517-589-5263 or E-mail [n8vys@voyager.net](mailto:n8vys@voyager.net).

**KALAMAZOO, MI** The 20th Annual Kalamazoo Hamfest will be hosted on October 13th by the Kalamazoo ARC and the Southwest MI Amateur Radio Team. Vendor setup is at 6 a.m., doors open to the public at 8 a.m. Advance tickets \$3, \$4 at the door. Trunk Sales \$5. For tickets/tables, send SASE to Kalamazoo Hamfest, P.O. Box 555, Galesburg MI 49053. E-mail to [Hamfest@KalamazooHamRadio.com](mailto:Hamfest@KalamazooHamRadio.com), with the Web site at <http://www.kalamazoohamradio.com/hamfest>.

**WALLINGFORD, CT** The Meriden ARC, Inc., will present the 10th Annual Nutmeg Hamfest & Computer Show, featuring the 2002 American Radio Relay League State Convention, Sunday October 13th, 9 a.m. to 3 p.m., rain or shine, at the Mountinside Special Event Facility, High Hill Rd., Wallingford CT. Exit 15 Rte. 91 (North or South), follow signs. Vendor setup starts at 6 a.m. Inside selling space \$30 (booth space with 8 ft. table, and chair). If you reserve and pay in full before Sept. 13th, deduct \$5. Outside spaces \$20, one tailgate 30 ft. space. General admission is \$7. Children under 12 admitted free, but must be accompanied by an adult at all times. Make checks payable to *Nutmeg Hamfest*; send payment to Andy Purchia N1XXU, 116 Kensington Ave., Meriden CT. 06451. Phone 203-235-8440. Proceeds from this event will help support public service, scholarship and civic activities. VE exams contact is Joel Curneal N1JEO, 203-235-6932. E-mail [NutmegHamfest@qsl.net](mailto:NutmegHamfest@qsl.net); Web site [www.qsl.net/nutmeghamfest](http://www.qsl.net/nutmeghamfest).

## OCT 19

**GOLDEN, CO** The Rocky Mountain Radio League, Inc., will hold its 2002 RMRL Hamfest October 19th, 8 a.m. to 2 p.m., at the Jefferson County Fairgrounds, 15200 W. 6th Ave., Golden CO. Directions: Take the Indiana exit from 6th Ave. Talkin on 144.62/145.22 MHz. Admission \$5 per person, tables \$10 in advance or at the door. VE exams, ARRL forum, refreshments, door prizes. Contact Ron Rose N0MOJ, 303-985-8692, or E-mail to [n0mqj@attbi.com](mailto:n0mqj@attbi.com).

## OCT 20

**GODFREY, IL** The Clark Radio Club Hamfest will be held at Clark Community College,



Godfrey IL. Talk-in on K9HAM 145.230. Indoor flea market tables \$10, outdoor flea market space \$5. Tickets \$2 each or 3 for \$5 in advance. \$3 each or 2 for \$5 at the door. Tables are \$10 each, outside flea market spaces \$5 each. For reservations call 618-254-9465, or E-mail [n9fhh@exi.com]. For tickets and info contact C Radio Club, P.O. Box 553, Godfrey IL 62035; or call 618-462-4212. Talk-in on K9HAM 145.230 rptr. VE exams, all classes ARRL format. To pre-register, call Rich Morgan KF9F at 618-466-2306. Pre-registration is not required for those testing for the "no code" license. Registration starts at 9:30 the day of testing, exams start 10 a.m. to 10:30 a.m. There is a \$10 fee. Bring all papers. 605 forms will be furnished.

**QUEENS, NY** The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot, Flushing Meadow Corona Park, 47-01 111th St., Queens NY. Doors open for vendors to set up at 7:30 a.m. Buyers admitted at 9 a.m. Free parking, door prizes, food and refreshments. VE exams at 10:00 a.m. Admission by donation, buyers \$5, sellers \$10 per space. Talk-in on 444.200 rptr. PL 136.5, or 146.52 simplex. Web site [www.qsl.net/hosarc]. For further info, call at night only: Stephen Greenbaum WB2KDG 718-898-5599; E-mail [WB2KDG@Bigfoot.com]. For VE exams info call Lenny Menna W2LJM, 718-323-3464; E-mail [LMenna6568@aol.com].

**SELLERSVILLE, PA** The RH Hill ARC will host a hamfest at Sellersville Fire House, Rt. 152, 5 miles south of Quakertown and 8 miles north of Montgomeryville. Talk-in on 145.31. VE exams 10 a.m. to 1 p.m., all classes. Bring documents! Indoor spaces \$12 (table included), outdoor \$6, bring tables. Admission \$5. Call the Hamfest Hotline: Linda Erdman, 2220 Hill Rd., Perkiomenville PA 18074. Phone 215-679-5764. Visit the Web site [www.rthill.ampr.org].

## OCT 26

**RICKREALL, OR** Mid-Valley ARES will present its 8th annual "Swap-Toberfest" and Amateur Radio Emergency Services Convention. The Convention will be held on Saturday, Oct. 26th, at the Polk County Fairgrounds in Rickreall. Doors will be open for the convention from 9 a.m. to 3 p.m. the day of the event. Swap table setup will be from 6 p.m. to 8 p.m. Friday night, Oct. 25th; and at 7 a.m. on Saturday morning, Oct. 26th. Self-contained RV spaces available. Talk-in on the 146.86 rptr. PL 186.2. Features include swap tables, commercial dealers, meetings and seminars. Additionally, emergency communications vehicles will be on display from Marion and Polk County Emergency Management, Civil Air Patrol, American Red Cross, and others as available. For more info contact Dean Davis KL7OR, 503-540-3270, or E-mail to [kl7or@arrl.net]. To

download a copy of the flyer and pre-registration form (or register on-line), surf the net for [http://www.qsl.net/w7oem/swaprobe.html].

## OCT 27

**CANTON, OH** The Massillon ARC will present their 42nd annual hamfest, "Hamfest 2002" at Stark County Fairgrounds, 305 Wertz Ave. NW. From I-77 N take the downtown exit, turn left (W) on W Tusc., turn right on Wertz to fairgrounds. From I-77 S, take 4th St. NW exit, turn right (W) into grounds. Setup at 6 a.m. Admission \$5, under 12 free; 8 ft. tables with electricity \$12. Handicap accessible. Indoors and heated. Free parking. Talk-in on 147.18(+). Tables contact is Terry Russ N8ATZ, 3420 Briardale CR. NW, Massillon OH 44646. Visit the Club Web site at [www.qsl.net/w8np]. There will be an auction at 10 a.m. 15% commission charged on all items sold. You may buy back your own items at no charge.

**WESTMINSTER, MD** The Carroll County ARC will hold its 13th Annual Mason-Dixon Computer & Hamfest 8 a.m. to 3 p.m. at the AG Center in Westminster MD. Vendor setup begins at 6 a.m. VE exams begin promptly at 9 a.m. Great food, and free radio checks. For more info visit [www.qis.net/~k3pzn], E-mail [k3pzn@qis.net]; or write CCARC, P.O. Box 2211, Westminster MD 21158. Donation \$5, children under 12 free. Tailgate space \$5 per 12 ft. space. Vendor and tailgating setup 6 a.m. General admission 8 a.m. 8 ft. tables inside. \$12 per table, every 4th table free. Tables guaranteed only if reserved by Oct. 5th with full payment. No pay, no reservation. Mail to Mason-Dixon Computer & Hamfest, P.O. Box 2211, Westminster MD 21158. MD State law requires vendors to collect Sales tax. E-mail [k3pzn@qis.net]. VE exams, pre-registration required. Contact Phil Karras KE3FL, 3305 Hampton Ct., Mt. Airy MD 21771. Phone 301-831-5073; E-mail [ke3fl@juno.com]. Testing will be conducted on the hamfest premises. On-site exam check-in begins promptly at 9 a.m. No admittance to exam room after 10 a.m. Required for VE exam: original FCC license plus one copy, two forms of ID, one with photo; any CSCEs; exam fee, \$10 cash only.

## NOV 1, 2

**ODESSA, TX** The West Texas ARC will host their 2002 Hamfest on Friday and Saturday, November 1st and 2nd, at the Holiday Inn Center, 6201 E. Hwy. 80, Odessa TX. Hamfest hours will be 5 p.m. to 9 p.m. on Friday, and 8 a.m. to 5 p.m. on Saturday. VE exams will be available. Plenty of free parking spaces. Admission \$3, tables \$10 with one free ticket per vendor. For more info contact Craig Martindale W5BU, 1719 Rosewood, Odessa TX 79761. Phone 915-366-4521 or E-mail to [w5bu@arrl.net].

## NOV 9

**MONTGOMERY, AL** The Montgomery ARC will host the 25th annual Montgomery Hamfest and Computer Show in Garrett Coliseum at the South Alabama State Fair grounds located on Federal Dr. in the Northeastern section of historic Montgomery. Admission is \$5, free parking. Inside flea market set up 3 p.m. to 8 p.m. Friday evening, November 8th; and 6 a.m. to 8 a.m. November 9th. Doors open to the public from 9 a.m. to 3 p.m. CST. VE exams on site beginning at 8 a.m. Testing by CAVEC. Bring original and a copy of your current license, picture ID, and \$3 fee. Talk-in on 146.24/.84, W4AP. Ragchew on 147.78/.18 with phone patch \*up/#down, 449.50/444.50, and 449.45/444.45. Flea market reservations are required to assure tables. Tailgaters welcome at \$2 per vehicle space. For more info write to Hamfest Committee, c/o 7173 Timbermill Dr., Montgomery AL 36117-7405; or phone Phil at 334-272-7980 after 5 p.m. CST. E-mail [k4ozn@arrl.net]. For late breaking news and events, visit [http://jschool.troy.edu/~w4ap/].

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## Sleeper Package Comes Awake

*If you are like me, every now and then something comes along that looks good but you just can't seem to make it click. This happened to me with a program named PSK-PAL, which is, as you can tell by examining the name, obviously another PSK communications program.*

There is a little history to this software. It showed up well over a year ago, and I have lost record of how I became aware of its existence. I downloaded it and it is unique in certain respects. One that stands out is the fact there are three receive panes and each has its own waterfall. Kinda fun.

The software always has been good on the receiving end, but I had problems getting it to drive the audio for transmit. I tried it in several computers, under different operating systems and corresponded with the author, Erik VK7AAB. I think I only identified one user over the air and I was not in contact with that ham to see how it worked for him, and Erik was at a loss. Obviously, it must have worked for him and others in his neck of the woods.

I put the PSK-PAL on a back-burner and never quite forgot about it. In the ensuing months, I found a truly great SSTV editor by Erik. SSTV-PAL, that works flawlessly and has been the subject of a couple of columns here.

The luck of the draw seemed to prevail recently as I was getting the Web site links corrected and I ran across a very recent modification for PSK-PAL on Erik's FTP site. I should spend a few lines here and explain something about the URL listed for PSK-PAL and SSTV-PAL.

This site is a strictly no-frills directory of the files available for download by you as an interested ham. I am sure when you bring up a page that says simply, "Directory of /~crac" you are sure you have hit the wrong key somewhere. Not so, you are really there. The available files are the product of the "genius at work" and are ready to be downloaded and enjoyed.

### The rest of the story

That is just what I did. The original zipped full version of PSK-PAL is about a 1.6 MB

megabyte file. The latest modification dated July 4, 2002, is a little less than a 0.25 MB download. Very quick, and I installed the two files that appeared after the unzip in the PSK-PAL directory. They were replacements for two existing files.

All that was left was to boot the program and check the setup. The program uses the PTT which setting agreed with the comm port into which the PTT circuit is plugged. I thought I was up and running. Clicking transmit seemed to work. The rig keyed up, but I needed to tweak the Windows sound driver. I am still behind the times. That is, I am using the cables direct from the soundcard to the accessory jack on the back of the Icom rig. Those of you using the commercial interfaces need only adjust a knob to set the ALC level.

Along with this is a nice little "Set Transmit Output" function found in the Soundcard pull-down menu. Clicking here displays a slider over the TX button on the right of the monitor display. You can watch your ALC and power meter while you adjust here and then click "Done," and the setting remains for subsequent boot-ups. I still had to revert to the Windows sound driver which does not always stay where I put it, but that is just a local problem. If I ever get serious about this stuff I will ... cure that?

Anyway, bingo! The transmit problem was cured. I hunted around and found a contact and the report was very good. Then I went back and started reading the Help file. This program has some excellent features that may just entice you to give it a try.

To begin, I found I had not edited the macros to fit my needs. Easy chore, right click the macro buttons and edit. Everything you need to know is available in the edit screen. Then I discovered a built-in log feature. As the Help file indicates, PSK-PAL

is intended for casual ragchewing and this means the log conforms to the no-nonsense, non-contest principles. However, you will find it is quite intuitive. I have no reason to believe the log can be exported into any other log, but that is not something I would hold against the software. Most casual hams don't require such refinements.

Speaking of casual ragchewing, that is my mainstay. It is not unusual for me to make a contact that lasts in excess of a half hour. There is an exception. This is being written in midsummer and the paths are not holding up for long transmissions, but if the path does hold up then there can be a lot of short bursts of really important info. Nice thing about the digital modes: They do hang in far better under marginal conditions than phone.

One of the novel things I found was the ease in swapping between the three receive panes. What always makes me take a deep breath when using a program with more than the "main" receive display is what to do when I spot a CQ on one of the other panes. Not a problem here.

I found two buttons labeled "Use Ch1" and "Use Ch2". What you do is simply click one of these buttons and the swap of text as well as the waterfall trace selected takes place. You are ready to give that fellow a call just that easily. That is fun and refreshing.

I also found that, even with my late model soundcard, that seems to get me in trouble "chasing" signals often as not, every QSO turnover was almost exactly on frequency, and no complaints from the other end. I did notice a feature that had me wondering for a minute, speaking of tuning. I found that two signals with a space of perhaps 70 Hz between offered a tuning problem. The program would "home-in" on the stronger signal.

A trip to the AFC pull-down revealed a simple solution for this phenomenon. The



AFC width is selectable. I like to have a program follow a wandering signal most of the time. But you can have this by choice. You are afforded 10 Hz, 50 Hz, and 100 Hz. I changed it from 100 Hz to 50 Hz and seemed to gain the best of both worlds. It would still follow straying signals as well as allow tuning to the weaker signal I wished to track.

PSK-PAL is a lot of fun to use, not only because it is different, but you can get the feel of what the ham was thinking when he sat down to write something that fit his operating style. He has answered some of the needs by using approaches not found elsewhere. When you get a chance, give it a try.

## The Chart on the Web

Many of you have responded favorably to the ease of use of The Chart since it is on the Web. Change comes slowly. After two months, I realized a notation belongs in the heading to this column. But, even so, you were finding the Web site just fine.

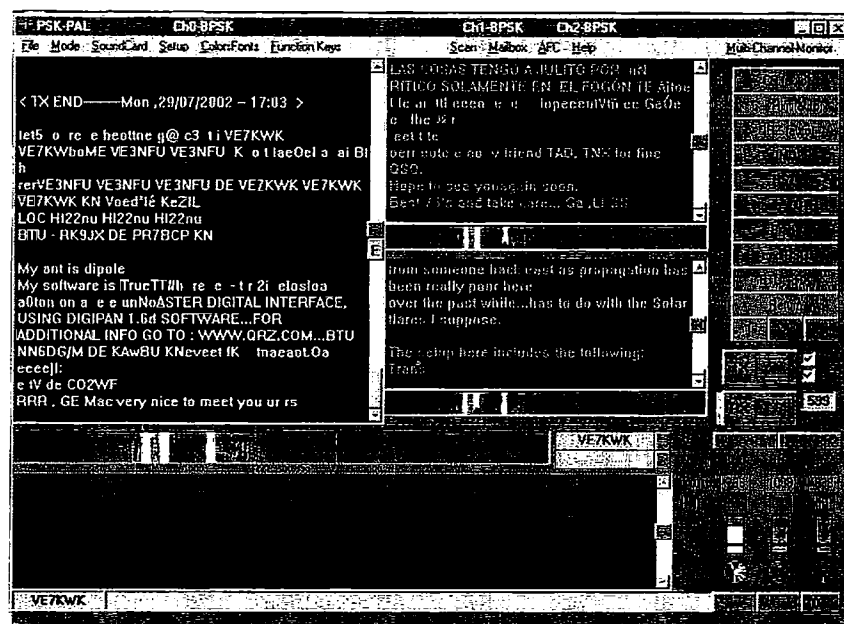
The convenience factor is the part that is most worth the effort to get it in place. The typing errors are eliminated. Just simply decipher the short definitions I have given and click, you are on your way. Glad I did it, or should I say, "I am doing it?" It is one of those projects that goes on for a long time. To be honest, I think I had the links organized and working just in the nick of time, less than a week before the August issue showed up on your doorstep.

Anyway, all that aside, I ran across some very good ideas while getting the online Chart in order. Some of it came while testing the links (Gee, that is quicker at this end also). And some came as I was comparing the other version of The Chart on the WA2HNG site. Bob had very graciously included The Chart in his Web site for the better part of a year while I procrastinated in setting this one up.

Bob has some links he added that are just plain fascinating. And, of course, I have been letting some of the new developments pass me by. So, I will start playing catch-up.

As I was looking through the links, checking to make certain they worked, I ran across several interesting ideas in need of discussion. Not the least of these was the PSK-PAL modification that is discussed at the beginning of the column this month.

There is so much information available for the ham on the Internet that it almost defies organization. The reason I say that is, first, each person is an individual with his own tastes. Secondly, though we are simply looking at a small segment of what is available, a lot of information overlaps.



**Fig. 1. PSK-PAL** — This is a screenshot where I actually have it tuned to and decoding 3 different PSK signals. Note the separate waterfalls. The macros are easily edited after a right-click. And there are 3 macro sets selectable with the boxes just below the buttons. There are hot-keys for Xmit and Rcv and the function keys also activate the macros which can include Xmit and Rcv or you may simply click the TX and RX boxes. The Help file is to-the-point and thorough. The program has tool-tips you can turn on so you can get a quick run-down on any unfamiliar button or feature when you touch it with your mouse cursor. You can stop the auto-scroll of the main receive pane by clicking the "E" halfway up the right side, allowing you to take a no-hassle look back at previous information. There are individual IMD readings for all 3 received signals. The "casual" log line at the bottom allows you to type in whatever you desire and it all reappears when you type in the callsign next time. Not a contest program, but a nice intuitive piece of software for relaxed operators; and did I mention FREE?

I find, even with the multitude of excellent search engines hovering out there, it is difficult to find precisely what we are looking for every time. So I settled back to look at just The Chart and realized I have not as yet put everything in alphabetical order. A person would think that would be a first consideration. Of course, this listing had its beginning about five years ago. A pretty lame excuse, but it will have to suffice.

There are some highly educational ham Web sites. One of the first that comes to mind is by Murray Greenman ZLIBPU, which has a link in The Chart and is listed with MFSK. Now, that URL is top-notch in my opinion because it really tells as much of the whole story as most of us care to digest in a sitting. And there are plenty of references to available software to go along with the history and development lesson.

Other sites come to mind. I think I have a lot of software download sites listed. The G3VFP site by Dave has even more. I often check there to see if I am up-to-date.

## Linux pops up with a surprise

Now I have to tell a little story about the discovery of a new (to me) ham Web site. I answered a CQ the other evening and here was a fellow casually mentioning his setup which was running on Linux with TWPSK software. Plus, he added that he shared authorship in the program he was using. I think the reference was "homebrew software."

As you can imagine, that really got my attention. Of course the path was only so-so as usual of late. But he did send his Web site. Naturally, Murphy's Law took effect and I got it wrong and, in the process of running a search for his callsign on the Web, I came up with an excellent informative Web site.

A little catch here: The Web site's primary language is German. That's OK by me, but my ability to interpret diminishes quickly after a few stock phrases. However, there is a large portion of it in English, so I persevered. Wouldn't you know there

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## Balancing Act

*The key to amateur radio, in my opinion, depends upon the ability to maintain a balance. This balance may be among different modes of communication, different types of communications, or perhaps how we approach the hobby.*

Sometimes, in order to balance different issues, it may be helpful to go back to the basics. Part 97, the regulations that govern amateur radio, includes the following, which defines the purposes of amateur radio:

"The rules and regulations in this Part are designed to provide an Amateur Radio Service having a fundamental purpose as expressed in the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communications and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

(e) Continuation and extension of the amateur's unique ability to enhance international goodwill."

**(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.**

It has now been over a year since the terrorist attacks on the World Trade Center and the Pentagon. Many of us have been concentrating on preparing to provide support for whatever emergency or disaster may come next. Even if there are no further attacks, there will always be something where our skills are needed — an industrial

accident or a natural disaster. The ARRL recently received funding from the federal government for training amateurs in emergency communications. The funding is important, but even more important is that the federal government has acknowledged the importance of the role of amateur radio.

I for one will never underplay the importance of disaster support, but there are other reasons for the Amateur Radio Service to exist, and it is equally important that we not neglect these other areas as well. When a military unit is placed on high alert, the commanding officer knows that the crew cannot stay at such a level for very long or they will lose focus or the ability to respond. A wise or experienced commander will stand down his crew when possible so that when a heightened level is required they will be focused and attentive. We need to balance our public service responsibility with the other aspects of the hobby as well as balancing our responsibility to serve with our privilege to enjoy the hobby.

**(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.**

It's interesting that the regulations refer to the "art" and not the "science" or "technology." This seems to focus on what the service can do and what it can add to society. Art alludes to enjoyment and even entertainment, and this is an important attribute. Public buildings, monuments to our heroes, and public parks all rely on art to make a statement and support the primary function. CW, for example, has gone from the only mode of communications available to amateurs to one of many. It has, in many respects, become more of an art enjoyed by many amateurs.

**(c) Encouragement and improvement of the Amateur Service through rules**

**which provide for advancing skills in both the communications and technical phases of the art.**

Similar emphasis seems to be placed on both communications skill and technical skill. I notice here that the skills for both communications and technical are stated. To me this says that our ability to communicate is every bit as important as our ability to construct devices. If you remember your first time as a net control operator, you can probably remember how your skills needed advancing. Everyone's does! Both aspects of the hobby are significant and important to its overall success and growth.

**(d) Expansion of the existing reservoir within the Amateur Radio Service of trained operators, technicians, and electronics experts.**

Many times people interpret this as referring to a pool of talented people who can be drafted or otherwise assimilated into the military. While this may have been true at one time, it is not directly stated. Today, a pool of trained people may be needed more in support of homeland security than in uniform. Personally, I believe that this section specifically does not address where or how these people may be needed so that such a pool will be available regardless of what need materializes. It's kind of like money in the bank. If I put some money away for a rainy day, I am tacitly admitting that I don't know what emergency I expect to face. I believe that we need a pool of trained operators, technicians, and electronics experts, but that the reason should not be defined.

It is important to notice technical aspect is mentioned in both (c) and (d), so those among us who point to the importance of the technical aspects of the hobby do have

*Continued on page 56*



# AMSAT Meeting Announced

*It's that time again. AMSAT (The Radio Amateur Satellite Corporation) has announced that the 20th Space Symposium and AMSAT-NA Annual meeting is to be held November 7-11, 2002, in Fort Worth, Texas.*

Every year, AMSAT members and satellite enthusiasts get together to share information and learn from others. The AMSAT Symposium and Annual Meeting moves to a new site every year. This time it is in southwest Fort Worth near the Lockheed Martin Aeronautics Company. Previous meetings have been held in Los Angeles, California; Portland, Maine; and many points in between. This year's event will chronicle past, present, and future amateur-radio satellite technology developments with some fun extras.

If you have not attended an AMSAT event in the past, make plans not to miss this one. While the schedule shows activities from November 7th through the 11th, the most important days will be Friday, November 8th, and Saturday, November 9th.

These two days are for the presentations and talks. Topics to be covered include operating methods, antenna design, spacecraft design and construction, status of current missions, proposed projects, digital techniques, telemetry studies and microwave systems. It is more information packed into two days than anyone could assimilate. Fortunately, the papers and presentations are also included in the Symposium Proceedings, a multihundred-page document that is included in the registration cost. Registration before October 16th is \$30, but is \$35 after October 16th. The price at the door is \$40.

Following two days of information overload, there will be a short break before the annual meeting and social activities commence. At the general meeting, updates on the financial status of the organization will be presented, in addition to a review of project status. The meeting concludes with a question and answer session with all AMSAT officers and directors present. It's a great opportunity for members to ask hard questions and get direct answers.

The AMSAT banquet is always excellent. In addition to a very affordable \$30 cost, there will be a keynote speaker to provide yet another talk, but this time on a topic that works for all attending, including those who are not hams or satellite chasers. Dress is usually more formal, with sports jackets, and even a few suits.

Then there are the awards presentations and prize drawings. The awards recognize those who have been distinguished volunteers during the past year, and also include a plaque for the first-place winner of the AMSAT Field Day competition. And then there are the prizes. It's always a great selection of hardware, software, and books that all hamsat chasers appreciate. After the grand prize ticket is drawn, it's time for a night's rest before the Sunday events.

Thursday, November 7th is reserved for a surplus electronics store tour. Maps,

addresses, and directions will be provided for those who wish to participate. Thursday is also a day for antenna range and preamp testing.

A tour of the Lockheed Martin Aeronautics Company is scheduled for Sunday, November 10th. This promises to be an exciting event that many Symposium attendees will attend. For early risers there will be a Field Ops breakfast for current and future AMSAT Area Coordinators. Later in the day, the AMSAT Board of Directors meeting will begin.

While most of the Board meeting is open to all, there will be at least one closed session for financial discussions, usually associated with salaries and contracts. The meeting will break in the late evening and start again early on Monday, November

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*Photo A. At a hamfest in Austin, Texas, the AMSAT Symposium chairman for 2002, Keith Pugh W5IU, draws a crowd for a UO-14 satellite pass.*





**Photo B.** Keith made several excellent contacts with 5 watts to a handheld dual-band yagi via UO-14.

## HAMSATS

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11th. Sometime in the late afternoon, it ends.

Don't miss the 2002 AMSAT Space Symposium and Annual Meeting. Arrangements have been made with AmeriSuites of Fort Worth for special rates. Details on how to register for the event, reserve a room, and arrange transportation are on the Internet at [<http://www.edtexas.com/amsat/>]. AMSAT VP of Operations Keith Pugh W5IU is the Symposium Chairman this year. I'll see you in Fort Worth!

### In Germany and England

AMSAT-NA is not the only organization to hold yearly meetings with papers,

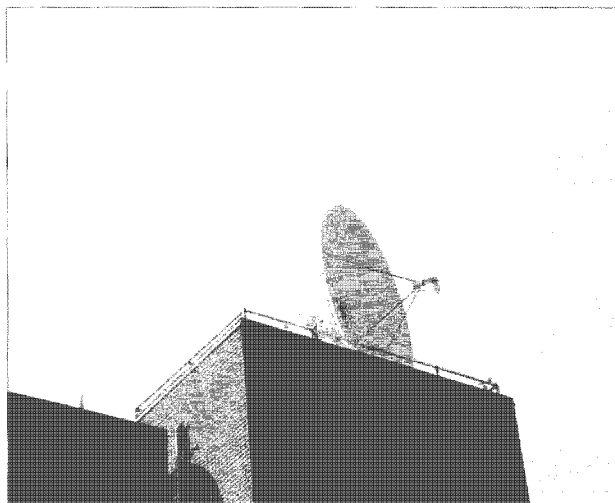
presentations, and demonstrations. Two of the more prominent overseas groups with gatherings in July, 2002, were AMSAT-DL in Germany and AMSAT-UK in England.

The German group has announced that they have decided to go ahead with two new spacecraft, AMSAT-Phase 3-E and AMSAT-Phase 5-A. The Phase 3-E spacecraft is to be a continuation of the high-orbit, long-life satellite program. Work has begun on models and the basic spacecraft bus. Frequencies to be used range from 145 MHz through 10 GHz. Design details are expected to be finalized this year, with a launch in 2005.

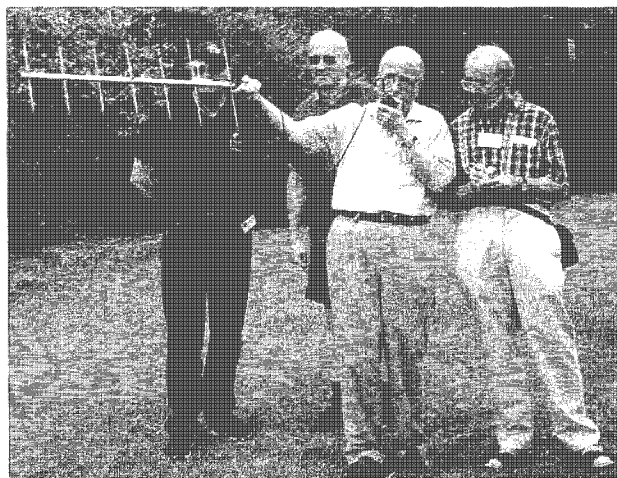
The Phase 5-A program is far more ambitious, and expensive. Based on an AMSAT-DL membership survey, and the

goals of the German hamsat builders, the Phase 5-A spacecraft is to be a Mars probe. Many of the systems on AO-40 proved to be sufficient to the task of a mission to Mars. AMSAT-DL now plans to do just that — GO TO MARS. The spacecraft will likely be launched by Arianespace from French Guiana, and will not only carry scientific experiments, but also some small payloads to be released toward the Martian surface after the main payload has achieved orbit around the planet. Can it really be done? Suitable launch windows to Mars exist in 2007 and 2009. Check the Web sites [<http://www.amsat-dl.org/p3e/towards-p3e.pdf>] and [<http://www.amsat-dl.org/p5a/p5a-to-mars.pdf>] for more on these new projects.

Later in July, over 90 enthusiasts from 16 countries attended the AMSAT-UK Colloquium in Surrey, England. The AMSAT-DL projects were officially announced for the first time at the colloquium, to the delight of many and the skepticism of some. Activities in Surrey included presentations, antenna testing, barbecue by the lake, a tour of the University of Surrey satellite clean room, and live firings of prototype satellite propulsion systems. A new dish antenna for data collection and satellite control has recently been installed at the University. Ray Soifer W2RS, AMSAT-NA VP of International Affairs, worked with G7HIA to demonstrate trans-Atlantic contacts via UoSAT OSCAR-14 using portable gear. Copies of the AMSAT-UK proceedings are usually available in both paper and electronic formats. Check [<http://www.uk.amsat.org>] for details. 73



**Photo C.** The University of Surrey has a new dish for S-band hamsat operations, on a gimship mount. (K5OE photo)



**Photo D.** AMSAT VP of International Affairs, Ray Soifer W2RS, made trans-Atlantic contacts via UO-14 while at the AMSAT-UK Colloquium in Surrey, England. (K5OE photo)



## Coaxial Test Devices

*Last month we covered the application of coaxial relays and discussed some attributes and faults of particular connectors. As far as most test equipment is concerned, coaxial connector use varies greatly. However, clues about the use of BNC and UHF connectors at microwave are very limited, especially above 1 GHz.*

Most notably displayed in a lot of amateur microwave workbenches demonstrating use of an "N" connector is the HP-432 series of power meters. The 432 power meter is a workhorse on my test bench. It is limited in power range from minus 20 dBm to plus 10 dBm (maximum). Frequency-wise it is rated from 0.1 to 12.4 GHz, with its thermistor power head a 478A which is fitted with a coaxial "N" connector. As a great commercial piece of test equipment, it demonstrates confidence in microwave operation for the "N" connector.

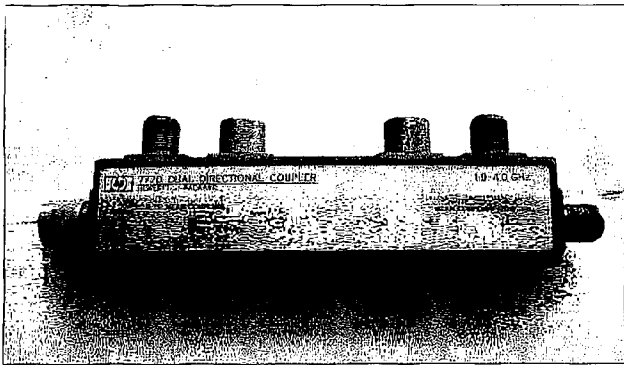
There are better connectors, such as the APC-7 connector, which is a genderless, constant impedance connector. What is meant by constant impedance is that SWR through the connector measures like the connector was not there, mimicking a section of coax cable. The "N" connector consisting of a pin and socket create a small but manageable impedance irregularity. This is created by the small diameter

changes in the center conductor to outer diameter ratio, i.e., the pin and socket. While the APC-7 connector is quite expensive, it offers near perfection in connectors construction, maintaining the center pin's exact diameter. It is used primarily in high end test instrumentation. The APC-7 is kind of like a connector to test how good an "N" connector is performing.

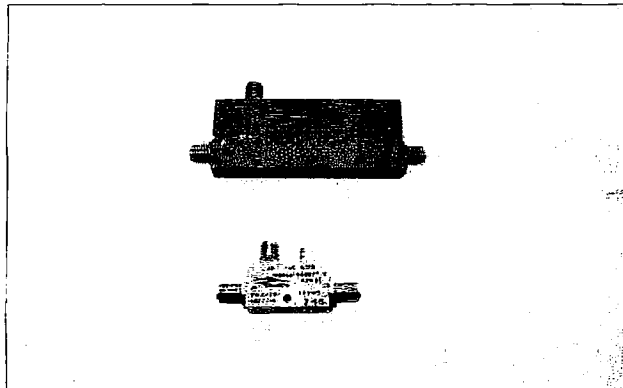
Looking at my coax adapter and test adjunct box, only a few instruments and test adapters use the APC-7 connectors. About 90 per cent of my devices use the workhorse "N" connector. Power splitters, directional couplers, frequency meters, sweep generators, mixers, detectors, attenuators, terminations, coax relays, microwave transitions, and plain old coax cable to name a few. In general, they're quite prevalent in test devices. Did you ever notice that for VHF use the BNC and UHF connectors abound, but for 450 MHz operation on some equipment the "N" connector is used?

Let's examine the "N" connector and the directional coupler, for instance. One application is testing power amplifiers to reduce power to an RF detector like the HP-478A power head (whose maximum RF input power should not exceed +10 dBm). (A suitable power attenuator could be used to make the measurement.) However, if you do not have, say, a 20 dB attenuator rated at 50 watts, what do you do? The answer is to use a directional coupler and accompanying attenuator to bring expected levels to less than +10 dBm maximum of the power meter thermistor head. Directional couplers can exhibit very high power capabilities and come in various dB levels (normally 10, 20, and 30 dB reduction between source and coupler output).

This means that using a coupler rated for the frequency of test, with 30 dB of coupled loss from directional coupler RF input to coupler output, reduces a 10 watt signal to +10 dBm as measured on a power meter

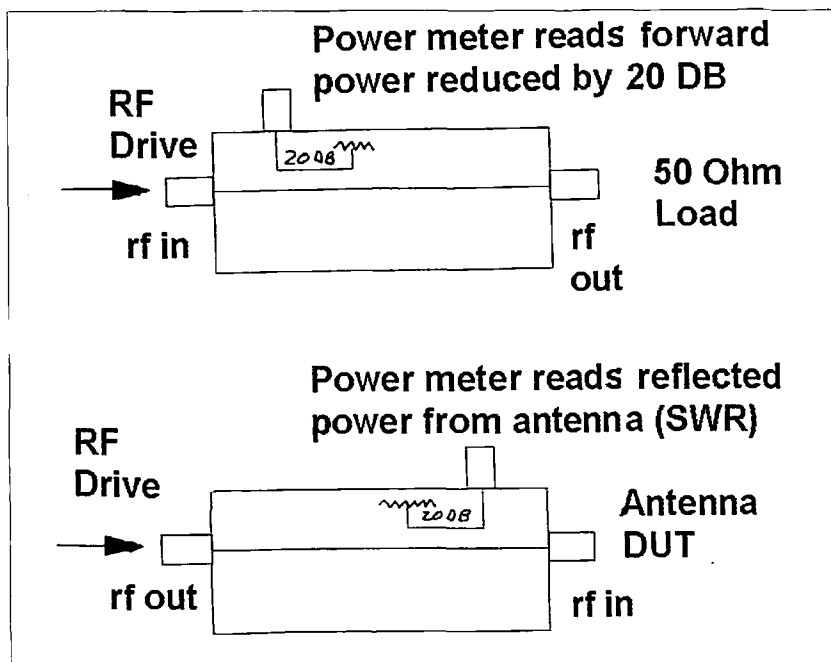


**Photo A.** Directional coupler rated for frequency of 1.9 to 4.0 GHz with input and output coupled ports a HP-777D 20 dB coupler. Not calibrated at 1296 MHz but measurements produced very acceptable results. I would highly recommend its use at 1296 MHz. Manufactured by Hewlett Packard.



**Photo B.** Smaller SMA coaxial couplers. Top coupler, 20 dBm Omni-Spectra 1 GHz to 1.5 GHz coupler used for 1296 MHz antenna evaluation. Bottom of photo, very small 2 to 5 GHz, 10 dB coupler. Manufactured by Omni-Spectra.





**Fig. 1.** Drawing showing a 20 dB directional coupler (**Photo B** top) depicting direct coax and coupled coax ports and terminations on far end of coupled port. Note use on forward power direction of coupler compared to reversing coupler in circuit and using directional coupler (reversed from forward power measurements) for antenna SWR/return loss measurements.

(10 watts = +40 dBm). A directional coupler is essentially a loosely coupled section of coax sampling RF from a nearby RF section of coax. The main input is a direct connection to the main output port with almost no loss at all, a direct coaxial connection, with a short slit in the coax shield. The sampling coax butts up to this slit with a matching slit in its shield to allow sampling coupling. The amount of coupling depends on the length and width of the slit. Power capabilities of this arrangement are quite high, not a problem for high power applications.

If your directional coupler has three ports, RF in, RF out, and coupled output, then the coupled output only looks at power so many dB down from RF input — 20 dB in the example above. It is not affected on reflected power from the output because it is directionalized and only looking at forward power. Reflected power is being dissipated in a 50 ohm termination resistor internal to the coupler on the far end of the coupled sample coax line. This is a very important observation to remember. Forward power is reduced in power by the loss of the

coupled output on a three port directional coupler and is not affected by reflected RF due to a mismatch (high SWR or poor return loss).

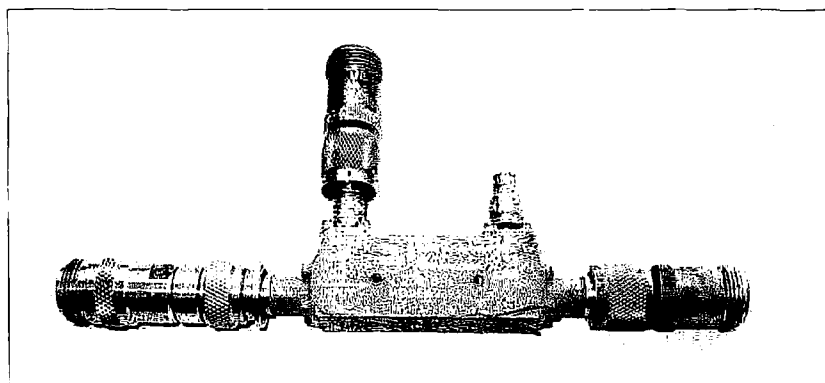
A safe method to measure a transmitter's power level is to place an additional attenuator of at least 10 or 20 dB on the coupler output to not overpower the 478 power meter head. In this case, 10 watts input to the 30 dB coupler, plus, say, 10 dB of added attenuator for safety's sake, would produce zero as read on the microwave power meter. Remember 10 watts = +40 dB, minus 30 dB for the coupler and 10 dB for the attenuator = zero dBm.

With the same setup, if you read -3 dB, then the device you are measuring is putting out 5 watts of power. A change of 3 dB either positive or negative doubles output power or cuts it in half — it works both ways. I like to think that my 2-meter HT puts out 2 watts, as advertised, on high power. That's +33 dBm, subtract 3 dB and that's 1 watt. Work it out as +40 is 10 watts, subtract 10 dB and that's 1 watt. Double 1 watt (+3 dB) and that's 2 watts. Going backwards, +40 = 10 watts, minus 3 dB = +37 = 5 watts, minus 3 dB = +34 or 2.5 watts, and so on.

What a nosebleed, but essential thinking for test equipment setup so that you do not overpower a delicate power meter thermistor. It's always a good safe trick to use more attenuation when unsure what you are going to measure. You can always reduce attenuation easily, but it's too late when overpowering a thermistor mount and stressing it with too much power.

The importance of the numbers game and related powers expressed is because it is important to figure out what power you need to have at each portion of a test setup vs. going and making an error and blowing up a very expensive power meter thermistor head. They're very accurate for power measurements and very fragile and susceptible to overload power. Normal maximum power to not exceed is +10 dBm (that's 10 MILLIWATTS).

A little homework math. Assuming you want to measure a 50 watt transmitter using a 30 dB coupler, what level is 50 watts? By reducing the level with a 30 dB coupler, what level would you expect on the output of the coupler after 30 dB of attenuation? The answers are not hard, remember the rule: 1 watt = +30 dBm. add 10 dB (now 40 dB), power is 10 watts. Add another 10 dB (40 + 10) = 50 dB, power is 100 watts. To figure 50 watts level in dB, subtract 3 dB



**Photo C.** A directional coupler in my collection that seems to serve the entire microwave region from 2 to 18 GHz. I tried it at 1296 and obtained similar results as with the units in **Photos A** and **C**. At 5 and 10 GHz it performed just as well and as a 40 dB coupler, so with a signal generator as a signal source a sensitive power meter is required or a higher power transmitter must be used as the signal source.

*Continued on page 57*



## Foxhunting is a "Novel" Idea

*When I can't be out hunting hidden transmitters, the next best thing is to be reading about it. Maybe you feel that way too. After all, you're reading about it now!*

Readers of "Homing In" learn the latest in radio direction finding (RDF) technology, plus news of local and international "foxhunting" events. But I've found that some of my most popular columns have featured unusual tales of actual hunts. It isn't a big stretch to go from ham radio T-hunting "war stories" to the fictional use of RDF by Hollywood.

We've all seen classic movies and TV shows where the good guys hide a transmitter on the bad guys' car and tail them to their hideaway. I think one of the first was "White Heat" from 1949. A police officer infiltrates a team of gangsters led by James Cagney. He constructs an emergency beacon transmitter out of a radio receiver. FCC agents with rotating loop antennas on their sedans relay their bearings to headquarters, where they are triangulated on a giant map of the Los Angeles basin. Check it out next time you visit the video store.

### Murder for a fox

Just a couple of weeks ago, I read an Internet posting by Paul Gruettner WB9ODQ. I know Paul as an accomplished RDF contester who has won plenty of mobile T-hunts, plus an on-foot hunt at the Dayton Hamvention (**Photo A**). WB9ODQ was writing to promote a just-released novel by his wife Rebecca KB9LFW, that features RDF prominently in the plot. *The Fox* is published by Xlibris, a partner of Random House Ventures (**Photos B and C**).

Xlibris is an "on demand" publisher, which means that books are not printed until the customer's or bookstore's order is received. I went to the Xlibris Web site and discovered that this book is available both in the usual paper form and as an "electronic book." With my column deadline coming closer, I decided to try the e-book. It was cheaper (only \$8 compared to \$21.24 for

paperback) and I would have it within a day with no shipping charges.

I gave the Xlibris site my credit card information and a few hours later a 1.5 Meg PDF file appeared in my E-mail. This was my first experience with e-books and it took a while to get used to a totally on-screen experience. It looks just like a regular book, with 422 pages in all, including a cover page, dedication page, and Author's Note. But you can only read it on a computer.

With an e-book, you can't put a QSL card between the pages for a bookmark and toss it in the car to read in the waiting room while your new tires are being installed. You can't print out any of it, because the file is encrypted to prevent that. You can't underline the best parts. But you can read it on any computer you own, if the machine has the free Adobe Acrobat<sup>TM</sup> Reader software installed.

WB9ODQ is a professional electronic engineer who works at an architectural firm, performing power system design for hospitals. According to Rebecca, "He's been in Amateur Radio since he was in high school. We met in college in 1976 and on our second date he said, 'Hey baby, let's go on a foxhunt!' I went on it and I was hooked. I was radio-shy for a long time but finally got my Tech license."

WB9ODQ and KB9LFW still go transmitter hunting when they can. "I do the co-piloting, Paul drives and I turn the antenna," says Rebecca. "When it comes time to get out of the car in the mud and mosquitoes, I let Paul do that. Some of the hunters here have doppler sets, but most prefer the classic 4-element quad on a rotating mount."

Paul's career has taken the couple from Milwaukee to southern California, to Nashville, and back to Milwaukee, with plenty of T-hunting along the way. "That's the nice thing about ham radio, you meet the nicest people," KB9LFW declares. "When we came back, I got on the local repeater and the same folks were there. It's as if I never left."

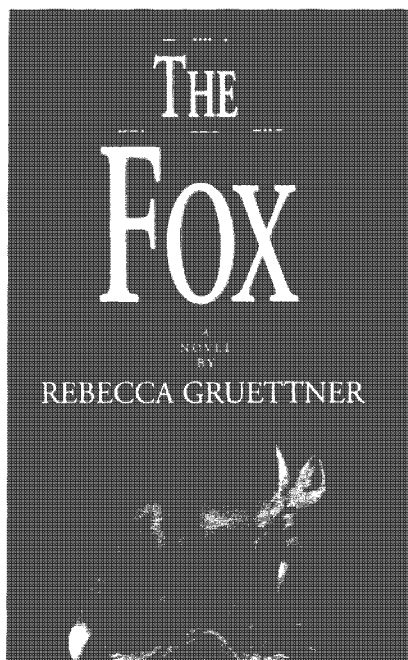
### Bearings and visions

Rebecca drew heavily on her experiences in California and on transmitter hunts for her novel. "It's a murder mystery whose heroine is a ham operator interested in



**Photo A.** Remember this "Homing In" photo from the 1999 Dayton Hamvention? Paul Gruettner WB9ODQ (at left) is accepting a new 6-meter transceiver for his performance in the 16-fox all-on-foot hunt. Now his wife has authored a novel that features ham radio and foxhunting.





**Photo B.** Cover of *The Fox*. (Image courtesy of KB9LFW)

foxhunting," she says. "Yeah, we write what we know about. Initially, my intended audience was fiction murder-mystery readers. It was Paul who suggested that maybe foxhunters would also get a kick from reading it."

I don't think I'm giving anything away by revealing that not only is the heroine a ham, but so are several other important characters, including the chief suspect in the murder investigation. But it's not the usual "ham hero saves the day" story. The electronics industry is also represented, probably because Rebecca has had a career in Quality Management. I was surprised that all the engineering companies in her novel are well managed and professionally run. Dilbert simply wouldn't understand this.

Though there is action-packed foxhunting in this book, there is much more psychic direction finding than radio direction finding. According to KB9LFW, "I believe we all have some intuitive sense. You know, like when we sense someone watching us. We're definitely picking up something somehow. Sometimes we're more attuned to this sense than at other times, depending on distractions."

She continues, "I've often wondered what it would be like to have a finely tuned sixth sense where I could receive psychic information via some cosmic wave, similar to a transceiver tuning in to the radio signals. My mind went into overdrive one day when I started writing my novel. I came up with

the idea that maybe a psychic's sixth sense could possibly work on this principle."

Hmmm, maybe if I had this heroine's psychic abilities, I'd win more T-hunts! For me, the juxtaposition of psychic experiences and true-to-life electronic science in *The Fox* was hard to reconcile. But for as little as eight bucks you can read it for yourself and decide if it works for you. There's plenty of action and a little romance in its 55 chapters, plus an interesting surprise at the end.

If you want the paper or hard-backed version, check your local Barnes and Noble store, which should be able to get it in three to four days. Rebecca says that mail-order from the Xlibris site takes considerably longer.

One more caution: *The Fox* is for adults. If it were a movie, I would have to give it an R rating. If you're looking for RDF fiction for all ages, read on.

### T-Hunting hooked me early

Everybody says it: "We need more young people in ham radio." The best way to recruit people of any age into ham radio is to show them that it's fun and exciting. To induce them to study for a ham ticket, we must appeal to their natural sense of adventure and competitiveness. What better ham activity is there for this than a hidden transmitter hunt? Perhaps that's why RDF has been featured in Amateur Radio fiction for youth by several authors.

At age 10, I liked electronics and short-wave listening, but I knew little about Amateur Radio. One day in the school library, I found *SOS At Midnight*, by Walker



**Photo C.** Rebecca Gruettner KB9LFW, author of *The Fox*. (Photo courtesy of KB9LFW)

Tompkins K6ATX (**Photo D**). By the time I finished reading its 150 pages of suspense and intrigue involving high school hams, I knew I had to get my ham radio license.

In the same library, I found Tompkins' second ham radio novel, *CQ Ghost Ship*. In it, principal character Tommy Rockford K6ATX and a new Novice make an amazing discovery on a Saturday morning hidden transmitter hunt in southwest Washington state. That was enough to make me start badgering the leaders of my local radio club

*Continued on page 58*



**Photo D.** Hams and future hams of any age will learn about our hobby and be entertained by ham radio fiction. These four books include RDF in their plots.



# CPR for Your ARC

*How to revive the local club.*

*My first experience with amateur radio came after a tornado came roaring through our county. I was a Disaster Volunteer for the Red Cross and they called the local radio club out to handle communications.*

I was a pre-teenager then. After finding out more about the club, I started taking the class they offered. After 8 weeks studying and learning Morse code, I passed my test. That was in 1990, when I was a young teenager. The first few years, I was active on the local repeater and advanced through the license classes to an Advanced Class license.

After 5 years of being in a radio club that was going nowhere but trying to keep a repeater up and running, I got bored. Don't get me wrong, the hobby did not bore me — it was the company. After leaving the hobby while in college and starting my "grown-up life," I decided to come back to the club that helped me achieve my license. I attended a few monthly meetings, participated in their nets each week, and simply found that the club really had not changed in five years.

As a young member of the club, I decided I must do something to keep this club alive. Yes, they did have a club station that was used only by a few members. The club station was located at the local Vocational School. The school had guaranteed that the radio club would get a better location for

the station and better access. This is true and it did happen, but no one wanted to step up and take charge of the situation. What situation? you may ask.

The club was trying to survive as a repeater club with the average age of a club member being in their mid-sixties. In order to draw new people into the hobby, the club had to expand. We are getting a new station location, but what do we put into it?

The newest equipment we had was a Yaesu FT-757GXII, not the latest nor most modern. After some research, it was found that the local Community Foundation offered grants to help local groups get equipment (usually schools getting computers or local 4H groups getting money to travel, etc.). A grant was applied for and received — our thanks to the club member who also made his return last year to the hobby after many years off, Tom AI8B. The grant allowed the club to purchase new, state-of-the-art equipment.

## **The status quo must go**

OK, now the club has a new home, new equipment, but still the same members. The members are not getting

any younger and we have had several SKs over the past year. After talking to a few of my comrades in the club, it was decided that we needed an attitude change, a leadership change, and new faces.

Wow, what a challenge. Well, I guess since I was coming up with all this discussion, it was thought that I should take over as president in the upcoming year. A job in which I really didn't know what to expect, but I took the challenge. What a challenge it was! So many hams with 30+ years experience and such broad interests, and then me, a 25-year-old with fresh ideas, wanting to change the status quo.

## **Getting the word out**

The first thing I did was to make sure all club members knew what I was trying to do. The club is for its members, and I believe all members should be aware of what is going on. The one thing that I did stress was that in order to survive in this area, we would have to be more than a repeater club. The phrase "More than a Repeater Club" became my motto. We

*Continued on page 59*



# QSL Archiving Made Easy

*A Pioneering way.*

*I know that I'm not alone in my desire to show off the QSL cards that prove my consummate abilities to work DX stations that others can't even hear. It just comes with the territory. Each of us wants to believe that we're among the best, and the cards we've garnered are our only proof.*

We pin them up on the wall of our ham shack until they take over all the available room that we desperately need to mount another coaxial switch. Then, with a heavy heart, the plainer ones get delegated to a shoe box or some other undignified container. Once the cards get stacked away, we no longer have the easy ability to show them off to our shack visitors.

However, as I entered the second half-century of my life and began giving

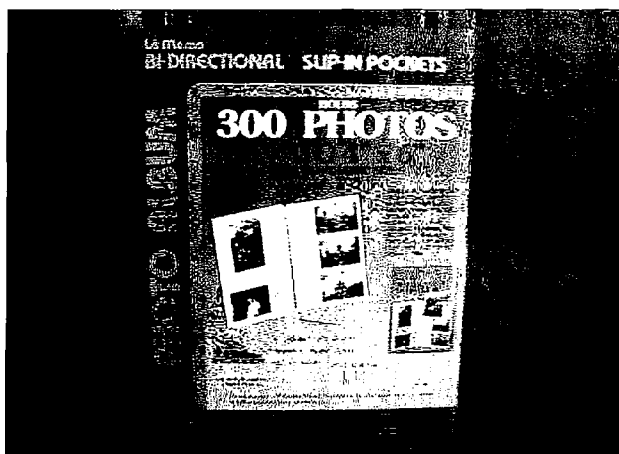
a bunch of stuff to my daughter, I came across a photo album that looked suspiciously like a QSL card display system. As I figured to give the photographs to my daughter anyway, I rapidly emptied several pockets to see if the calibration of my eye was correct and cards would indeed fit.

Slipping a few cards into the pockets, I realized that the Pioneer BDP-35 photo album (**Photo A**) was the answer to the storage dilemma. Each of these albums will store — and more

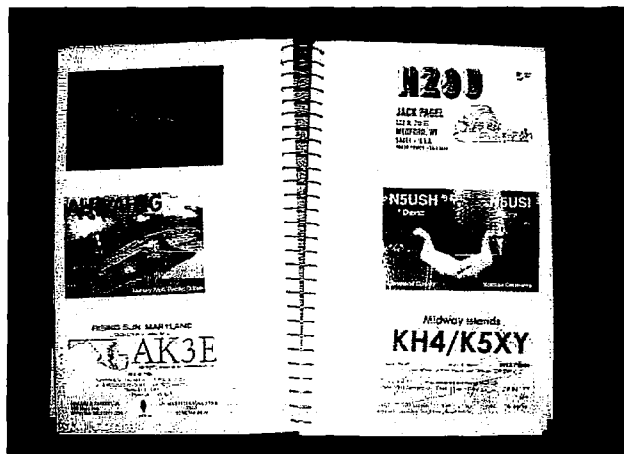
importantly, display — 300 standard-size cards in the clear plastic pockets, with three to each facing page (**Photo B**).

There was only one problem. I only had one album, and it had been bought years ago by my ex-wife. Now, it has been my observation that high-tech companies come and go, while low-tech ones merely transplant themselves overseas. So it was time for a Web search, and lo and behold, I found

*Continued on page 54*

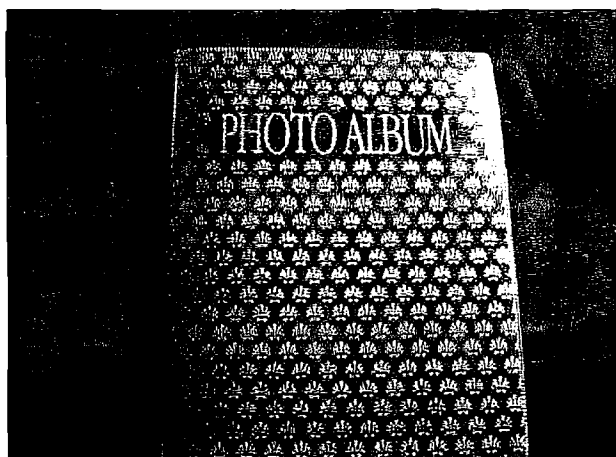


**Photo A.** Pioneer BDP-35 photo album: "grab-and-go" kit for 300 of your QSL cards.

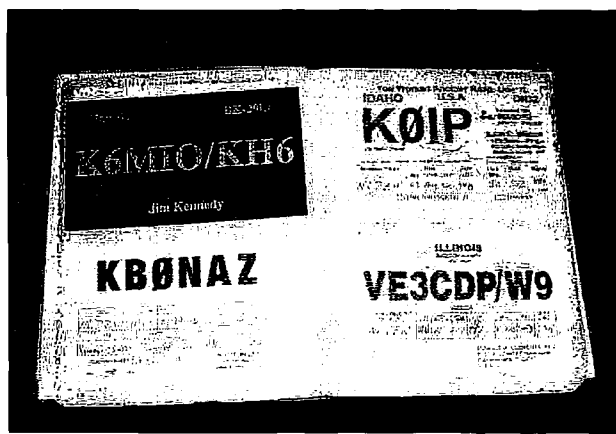


**Photo B.** You've got to admit that this looks really neat and is a perfect fit for QSL cards.





**Photo C.** This FC-246 compact album will hold 64 cards.



**Photo D.** The FC-246 compact album lets you show off your standard-size or smaller cards four at a time.

## QSL Archiving Made Easy

*continued from page 53*

their Web page. And I do mean Web page — all of one page.

Still, there was a hot link to their E-mail, so I asked them for a distributor. Next day, I had a toll-free number for Chadwick's Photo Specialties in California (1-888-229-3020) and within moments, my credit card number ensured that four more albums were on the way. Those of you who live in more populated areas can probably find the same albums at the big box stores.

Once the albums came in, I was in my element as I began slipping the cards into the albums. As part of the shipment, I also got an FC-246 (**Photo C**) compact album that would hold 64 cards with two to the facing page (**Photo D**). This was ideal for WAS, and as a bonus, enough room was left over for Canadian provinces. While the BDP-35 album can store oversize cards vertically, the smaller FC-246 is limited to standard or smaller cards only.

With Pioneer albums, we can now store hundreds of cards in a convenient

book holding 300 — cards that would usually take up 40 square feet of wall space. More importantly, the cards, if you arrange them right, are ready to take to a hamfest or ham meetings for awards confirmation.

When I purchased my albums (several months ago), the BDP-35 albums were \$14.99 each and the FC-246 albums were \$3.99 each. You can call Chadwick's at 1-888-229-3020, or write for prices at Chadwick's Photo Specialties, P.O. Box 2370, Chatsworth CA 91313-2370. Or E-mail [albums@chdwcks.com]. 73

## Close Encounters of the 5R Kind

*continued from page 32*

Orchidée, we went to get a last lemur fix at Les Lemuriens, where they have a number of black-and-white ruffed lemurs that are so tame that they will drink your glass of Coke if you don't pay attention.

I found the early morning sessions on the radio to be rather disappointing. I was generally too late for 30 meters. However, 20 meters was wide open to the USA at around 0400 UTC, but lacked activity. 10 meters in the late afternoons was excellent and I enjoyed some really good pile-ups. I promised myself a late-evening session on 30 or 40 meters, but for some reason, after a good dinner and a bottle of excellent Malagasy wine, I never actually made it.

The QSO breakdown looks like this: 30 meters — 51 QSOs, 15 DXCC entities; 20 meters — 250 QSOs, 31 DXCC entities; 17 meters — 244 QSOs, 40 DXCC entities; 15 meters — 19 QSOs, 10 DXCC entities; 12 meters — 85 QSOs; 25 DXCC entities; and 10 meters: 885 QSOs; 51 DXCC entities. Total: 1,534 QSOs, 65 DXCC entities.

My particular thanks go to my XYL, Jan; Solofo 5R8ET for arranging the license; his wife and family for their hospitality; Cortez Expeditions in Tana for the travel arrangements; and the management and staff of the Hotel Soanambo on Ile Sainte Marie, without whose help and understanding this operation would not have been possible. 73

## Letter From the Other Side

*continued from page 35*

assurances that houses and barns could be protected from lightning damage by its action.

This was indisputably the first practical and commercially useful application of electricity — the event which, more than any other, marks the beginning of the electrical age.

Father and I had our differences while we were alive. Ever the radical and a dreamer, he refused to make money from any of his inventions, offering them instead as gifts to the world. He often said that he only wished he could come back in 100 years to see what further progress his countrymen had made in controlling their natural world. Even now, from this place, it seems not to trouble him at all that the people of 2002 are pretty much ignoring this

Say You Saw It In 73!



anniversary of his launching of the art of electrical technology. But it troubles me.

(Signed) William Franklin

73

## Saving the Fleet

*continued from page 37*

NiMH, SLA, and Li-ion/polymer batteries, and is programmable to a wide range of voltage and current settings. Custom battery adapters simplify the interface with different battery types. A quick test program measures battery state of health in three minutes, independent of charge. Nickel-based batteries are automatically restored if the capacity falls below the user-defined target capacity.

Manufacturers of portable equipment support battery maintenance programs. Not only does such a plan reduce unexpected downtime, but a well-performing battery fleet makes the equipment work better. If the recurring problems relating to the battery can be eliminated, less equipment is sent to the service centers, a win-win situation for the user and the vendor.

This article contains excerpts from the second edition book entitled *Batteries in a Portable World — A Handbook on Rechargeable Batteries for Non-Engineers*. In the book, I evaluate the batteries in everyday use and explain their strengths and weaknesses in laymen's terms. The 300-page edition is available from Cadex Electronics, Inc., through [book@cadex.com], tel. 604-231-7777, or most bookstores. For additional information on battery technology visit [http://www.buchmann.ca].

73

## The History of Ham Radio

*continued from page 39*

“Biirgrmph bru rotary ge ge ugerumf om with my set rettysnitch spitty tone hit in potimus?” Now what do you suppose the poor gink was trying to say when he unreeled that? You have to guess a lot in wireless, and how would you guess this? Something is wrong with this fellow’s biirgrmph, his rotary also has a bad case of the ugerumf and

somebody around the place must have spit on his rettysnitch, because his tone was so rotten it hit him on his potimus. Sounds bad to me. Why will some people send such personal matter by wireless when the whole country can overhear? It isn’t decent, and it makes the QRM more rotten than ever, and just think of the way it makes a perfectly good logbook appear.

“I spent the better part of an hour trying to make out what ailed the poor

fellow’s biirgrmph, but had to give it up. What we ought to do is to organize an Anti-QRM Association. Then let us elect for Chairman the worst plug-ugly we can find in these U.S.A. Then let us chip in a little money and hire a clerk with a bad disposition who will write letters threatening the life of everybody whom the members report as causing needless QRM. Let us rise, fellow bugs — down with the fellow with the scratchy spark coil — down with the

# RIGrunner

## Intelligent DC power panel

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- 40 Amps total, outlets to run all of your transceivers and accessories.
- Each and every outlet individually ATC fused with LED open fuse indicators.
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- Perfect for home, mobile, rover, portable, emergency and contest stations.

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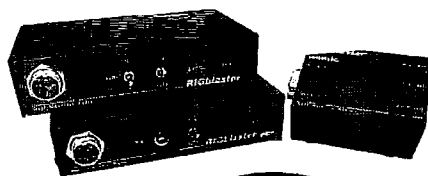
# RIGblaster

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The only no compromise sound card interfaces.

The easiest to set up, high quality, complete solution.

The best support too!  
Read our user comments!



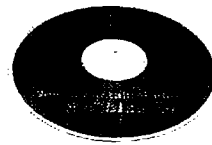
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fellow, the unspeakable skunk who calls somebody and sends a long relay message repeating each word three times when the station to which he is sending is sending one thing at a time himself.

"There, by heck, I have that stuff off my back and chest. Now you over there in Illinois, get this call — let everybody stand back from now on — I'm tired and sleepy and cross — and I don't care who I QRM, until I get that pin cleared off ..."

That was the way the Wouff Hong was brought into being, and it will continue to dominate the cold and blustery nights at ham gatherings to perpetuity — Believe it or not!! **72**

## THE DIGITAL PORT

*continued from page 43*

was a reason why I was led to this Web site by the search engine?

One of the authors of TWPSK is WA0EIR, the ham with whom I had been in contact originally. What does that prove? I suppose, if nothing else, when hams write software, they do it so they can use it on the air and talk to the rest of us just as if they "belonged." No derogatory inference meant there to all you ham programmers. You do belong. Sometimes we think of you as being on an untouchable pedestal.

I will have to go back and look, but I think that German Web site is another highly informative spot on the Web with many downloads listed. Additional fodder for The Chart, along with the WA0EIR site.

## Projects

One of the things I managed to get working during the last month was the addition of serial ports to this relatively new computer. I have mentioned, and you have probably noticed, most computers are going to the USB ports in place of the old-time 9- and 25-pin serial ports to which most of us, and our ham peripherals, have become accustomed. We are lucky these days if a new computer comes with just one old-style port where we may easily plug in such a device as a TNC.

This computer came with one 9-pin port (plus a dummy port even the manufacturer could not explain) and four USBs. The USB is a very user-friendly port — plug in a peripheral that is designed for it and the system finds it immediately and starts to **56 73 Amateur Radio Today • October 2002**

communicate. Works that way with my digital camera, plus another cable that signals the computer to do a magic shutdown when the UPS power supply kicks in.

I had ordered a board with four additional serial ports for this computer and found I had ordered wrong. So, made the swap for the correct one and learned another lesson in addition to paying attention when ordering. The first board had a bunch of jumpers to figure out and I had done my guesswork on that part before attempting the installation. Believe me, tedious, but I won't dwell on that.

The replacement board, made for this machine, had a whole new concept, at least for me. No jumpers, nothing to do but plug it in and put a CD in the drive and let it go through an almost totally automated plug-and-play routine. The only thing it needed me to do was restart the "installation" for each new port. When it was done, the ports are all identified in the Windows device manager. Strangely to me, the modem was designated as being on port 5 which never existed until that day. Never asked my permission, just did it. Don't argue with things that work.

By the way, the card that works costs twice the price of the one that did not. Perhaps the convenience of installation is worth it. I see folks paying a bit more for adapters to operate the older equipment from the USB ports, so it was still a bargain if I look at it that way.

So now I have three serial ports connected at all times. Not necessary for all applications, but it simplifies one portion of my life. The original 9-pin port has the PTT circuit plugged in. The four new ports are 25 pins and one of them has the rig control module plugged in and the PK-232MBX is plugged into one of the others. This leaves one for a hoped-for automated antenna rotator, and still one port not designated for immediate use.

That seems to be about as much as I should tell you about in one sitting. I was looking at this, and I think I see why I didn't get much air time this past month. Gotta change that. Take care, and by the way, I found something the past few months I didn't know. My E-mail address can be written without the "worldnet" included. That is, KB7NO@att.net is all that is necessary. Works both ways, though, so nothing to change if you have it in an automated address book.

Remember, if you are looking for The Chart, it's now on the Web at [http://kb7no.home.att.net]. 73 for now and will see you next time. Jack KB7NO. **72**

## ON THE GO

*continued from page 44*

a point. While many people take the opinion that real hams build their equipment from scratch, there are various degrees of construction. In the early days of amateur radio, a newly licensed ham would construct his rig from tubes, resistors, capacitors, a telegraph key, and headphones. The complexity of today's equipment is such that interconnecting various units is as complex as constructing a radio from components in the 1930s. My APRS system includes a personal computer, a TNC, a Peet Bros. weather station and two transceivers. The personal computer is specifically configured for my APRS operations. It is running one program for APRS and another for the weather station. The weather station has multiple sensing components spread all over the outside of the house. Each transceiver is configured in a specific way for APRS operations.

Most systems are not, in fact, "plug and play" and it takes a fair amount of hardware and software manipulation to get the entire system to work properly. Anyone who has had to track down IRQ conflicts, RFI generated by a computer, software bugs, etc., would support my view that this is not easy.

I believe that interconnecting the various units into a system advances the technical aspect of the hobby, particularly since every system tends to be just a little bit different and there really is no standard. While the pioneers in amateur radio may have wound their own coils or ground their crystals, they did not build their own tubes. We may do less soldering of discrete components, but that is called progress.

### (e) Continuation and extension of the amateur's unique ability to enhance international goodwill.

In today's world, this might be the most important role for amateur radio. At various times each of these purposes has risen to a higher level of importance, or receded to a lower level. Times change and needs change with it. Today many people in the world have various feelings and attitudes towards Americans. Some are not very positive. Some are outright hostile. Many of these feelings and attitudes might be based on incomplete or erroneous information about Americans. They may be based on propaganda, or even our television shows. I know my life doesn't imitate most television programs (with the possible exception of "Home Improvement").




I did not have the opportunity to attend the Hamvention in Dayton this past spring, but in what I read, Riley Hollingsworth's presentation apparently touched on this. This got me to thinking that we have a unique opportunity and an equally unique responsibility. We can be ambassadors to the rest of the world. Every QSO has the potential to impact how others perceive not just the American ham they hear, but by extension, every American. As such, we need to think that every time we key the mike on the HF bands, we are literally speaking to the world and creating the impression of Americans that may impact how people act toward us in the future.

So, based on my personal interpretation of Part 97 and the events in the world today, I am recommending that each of us:

1. Spend a little time having fun with the hobby.
2. Put on our party manners and talk with our counterparts around the world.
3. Actually spend some time conversing, rather than giving a signal report and moving on.
4. Listen to what hams in other countries have to say.
5. And, overall, try to enhance international goodwill.

When I travel, the most common interaction I see is people talking on cell phones. It is a very convenient tool and I use it myself on a frequent basis. There is a fundamental difference between amateur radio and almost every other form of communication, including telephone. In most cases, people connect with a particular individual with whom they have arranged a method of contact. This may be by providing another with your telephone number or E-mail address or chat room name. On the other hand, amateur radio is based on the concept that we have a desire to talk with other hams with almost no regard as to who or where they are. That is why we are tasked with enhancing international goodwill.

When I first wanted to get my license, it was the chance to talk with the world that appealed to me. I'm going to take some time to do just that! How about you? 

## ABOVE & BEYOND

*continued from page 48*

from the 100 watt level and get 47 dB = 50 watts. Subtract the example's couplers loss at 30 dB ( $47 - 30$ ) = 17. So if 50 watts minus 30 dB is +17 out of the coupler, +17 = what in watts?

Well, let's figure it out, getting rid of the 10 dB increments for example's sake. We stated above that if 100 watts was 50 dBm, and cutting it in half reduces power 3 dB, then 50 watts = 47 dBm. Moving the decimal one place for each 10 dB increment produces for 5 watts = 37 dBm, 0.5 watts = 27 dBm, and (0.05 watts) 50 milliwatts = +17 dBm. The nosebleed was done to show you that in the example above, if you were using a 20 dB directional coupler and a 2 watt dissipation attenuator, it would be in the range of its power rating. As specified, you would expect to see a half of a watt coming out of the 20 dB coupler and read +7 on the power meter after the 20 dB fixed attenuator on the coupler output.

The trick of using several attenuators, or directional couplers and attenuators in combination, to measure power is simple safety for both the power dissipation ratings of the coupler and attenuator, and to prevent over-power to the thermistor power head. In other words, don't use a 50 dB attenuator rated at 2 watts dissipation to reduce a 50 watt transmitter to zero dBm. Yes, it will work, BUT ONLY FOR A FEW SECONDS, IF THAT LONG! Get rid of the high power by sampling off 20 to 30 dB of power in a coaxial directional coupler to reduce power in the range a 2 watt attenuator can be used in its normal dissipation range. Remember, it's better to use more attenuation to prevent damage from unexpected levels than to guess and get it wrong. You can always reduce attenuation and remeasure levels. However once you overpower an HP-478A thermistor mount or other devices, they are history.

Have you ever used a Bird Model 43 wattmeter and its set of slugs for different power and frequency ranges? Welcome back to the directional coupler — that is what is going on internal to the slug inside the Bird 43 Wattmeter. Same thing — directionalized power measurements by reversing the slug and reading return or forward power. While it's a wattmeter, it's also an SWR meter displaying SWR or more commonly used return loss, a statement of the same thing. SWR is a ratio, and return loss is expressed in dB, the Bird meter in watts.

Another great use of a directional coupler is to measure return loss on microwave antennas. Construction of an SWR bridge for

1296 MHz will take some time to calibrate and balance, but if you have a directional coupler and power meter you can do the same job easily. Couple a signal generator to main output port (yes I said OUTPUT PORT) and the antenna on the INPUT PORT of the three port directional coupler. Connect a power meter to the coupled output port. With an open or short on the coupler RF input (antenna connection), note the power reading. Let's say with +17 dB drive at 1296 MHz and 20 dB of coupling, readings should be near -3 dB. This is due to forward power of +17 reflected back to the coupler output with 20 dB of coupling loss = minus 3 dB with a short or open.

Connect the antenna with a short section of coax (couple of feet) and measure reflected power now. With my 1296 MHz antenna connected, I read minus 19-20 dB. Subtract the minus 3 dB reading obtained with a short and the antenna's return loss is 17 dB, quite good. Note the difference between no antenna and antenna connected, and do adjustments for best (most negative number returned); this means the antenna is not returning power to the source or best SWR adjustment. We never hit it perfect, but it can come quite close.

For example, Kerry N6IZW and I both constructed Alford slot antennas for 1296 MHz and wanted to measure operation. We went through the procedures above and both worked quite well. I wanted to add a plastic cover for my antenna, and tested a section of PVC pipe near the radiating antenna's slot. I noted that the reflected power meter went from -20 dB to -8 dB. This indicated the plastic that I was going to use for a weather shield was worthless — it made the antenna look like a shorted section of coax. What was happening was that this variety of PVC pipe detuned the antenna and caused almost all power too be reflected back to the source, i.e., high SWR. Trying other materials proved that a fluorescent light plastic shield that was slipped over my fluorescent bench light did not show any action on the power meter — it acted like it was invisible. No reduction in the power meter reading (-20 dB), indicating good SWR and minimum or at least good return loss.

The directional coupler comes in many different frequency ranges and coupler loss factors. Check them; they can be a very useful device for power measurements as well as matching schemes vs. using an SWR bridge. Just making use of common devices and alternate test arrangements.

I would be glad to answer any questions covering this and related topics. Please send me an E-mail to: [WB6IGP@ham-radio.com] for a quick reply. Next time I hope to  
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describe the Alford slot antenna we constructed out of brass tubing for a good omnidirectional 1296 MHz antenna. 73, Chuck WB6IGP. 75

## HOMING IN

*continued from page 51*

to schedule a ten-meter T-hunt. I just had to try RDF!

Stories such as these and the "Carl and Jerry" series in *Popular Electronics* magazine got me going in ham radio. They fueled my imagination for new gadgets and encouraged me to learn more about radio and electronics, which led to a career as an engineer.

Tompkins, a prolific writer of westerns and screenplays, produced three ham radio novels in the 1960's, aimed at teenage and pre-teen boys. After a twenty-year hiatus, he came back to ham radio as a subject and wrote three more Tommy Rockford novels in the four years before his death in November 1988. He is missed, but others have taken up his effort to promote ham radio through adventure stories.

Today's best-known ham radio novelist is Cynthia Wall KA7ITT. She writes from a much different perspective than Tompkins. Unlike the athletic, technically inclined Tommy Rockford, who seemingly spent 24 hours a day being a ham, Cindy's lead character is Kim Stafford KA7SJP, a teenage girl for whom ham radio is just one part of a well-rounded life.

You would expect that such a heroine would appeal primarily to girls Kim's age and younger. Indeed, that was Cindy's intended audience, but her stories have much wider appeal. Several adult male hams have told me that once started, they had to stay up into the wee hours to finish reading Wall's books.

With careful research and attention to details, Cindy has produced four ham radio thrillers for ARRL. *Night Signals*, her first book, is the only one that includes RDF. Published in 1990, it tells how Kim and ham radio come to the aid of her new friend Marc Lawrence KA7ITR when he is injured on a solo hiking trip high in the Cascades. But my favorite is her second book, *Hostage In The Woods*. If you read Chapter 3 and the Author's Note, you'll see why.

## The Foxhunt Adventure

Another writer following Walker Tompkins' legacy is Dave Casler KEØOG, author of *The Foxhunt Adventure*, published

by MFJ Publishing. Written for young readers, it is a story of four youth attending high school and working in a pizza parlor in Louisville, Colorado, a town near Boulder. Illegal drugs are appearing on the campus and Ben Thompson KEØOG hears something very unusual in his hamshack that might help identify the source.

The next few days are filled with danger and intrigue. Ben and his pizzeria coworkers learn important lessons about ham radio technology and human interaction. One begins working toward her ham radio license. Her interest in improving her German by talking to DL hams and her attraction to Ben give her a dual incentive to study. Later, her budding knowledge of CW becomes vitally important as the story unfolds.

Dave Casler learned about radio in his childhood when his aunt gave him a Hallicrafters shortwave receiver. This interest led him to serve as an electronic systems officer in the US Air Force, and to get an advanced degree in electrical engineering. Today he is an engineer in aerospace.

"Like you, I got into ham radio because of the Walker Tompkins books," he told me. "I always wanted to do something similar to that, but never thought I could until I saw Cynthia Wall's first book. I read that and said 'Gee, I can do this.' And I put an outline together."

Casler drew on his T-hunting experiences at Brigham Young University to complete his tale of high school ham adventure. "I'd been interested in ham radio for years, but it wasn't until I was in college that I did something about it," he says. "The club I was in had a lot of T-hunts. We thoroughly enjoyed them. I thought they were the greatest thing."

The Tompkins and Wall books are readily available in paperback from ham radio dealers, in addition to direct mail from ARRL.<sup>2</sup> Cindy Wall often goes to ham conventions and is invited to give talks in Oregon schools about ham radio and writing.

On the other hand, Casler's book has not been promoted by its publisher. You probably can't find it in ham stores, but it's available by mail order from MFJ. Stock number is MFJ-3101. It is also available on the Web from Barnes and Noble.<sup>3</sup>

So if it's time to get a birthday present for a grandchild, niece, nephew, or any other young person who should learn more about ham radio, consider one or more of the Wall, Tompkins and Casler books. If it's for an adult, consider Rebecca Gruettner's book. But be sure to do your shopping early, so you'll have them in time to read yourself!



## Notes

1. ISBN 1-4010-4935-4 for paperback, 1-4010-4937-0 for e-book. On the Web at [www.xlibris.com/TheFox.html].

2. On the Web at [http://www.arrl.org/catalog/] in the History and Adventure section.

3. ISBN 1-8912-3708-X for paperback. On the Web at [www.mfjenterprises.com] and [www.barnesandnoble.com]. 75

## CPR for Your ARC

*continued from page 52*

have a beautiful club station with two HF rigs and computer interfaces that must be used. The next event that I had was to start a membership campaign with both word-of-mouth and letters. The hardest work was putting together a Recruitment Brochure. The brochure promotes the hobby and club in general.

The brochure allows the information to be available at the many public buildings. It allows for the general public to get educated about ham radio.

Another activity we are currently working on is a presentation to be made at schools and public gatherings (fairs, open houses, libraries, etc.). The presentation is being put together as a PowerPoint file so that anyone can run through it for a group. This presentation covers five main aspects of the hobby:

Introduction to Amateur Radio

What is HF?

What is a Repeater?

VHF/UHF Operations and Emergency Communications

Tower Safety

The plan is to add more presentations as time goes on — it was felt that these were a good starting point.

OK, we have accomplished (for the most part) an attitude change and a leadership change, but what about the new blood? Well, that will come with time, and it has only been five months. I feel as if it will take a good year to get this program in full swing. The success we have had has generated enough interest for the club to be able to offer a free Technician License

Class in the fall. We have a lot of work ahead of us, but I feel that the real hard work is now behind us. Now is the time to make sure the community knows about us, and we are putting on as many demos, special event stations, and presentations we are able to.

I cannot and will not take any credit for the club being where it is today. It took a lot of hard work by many members to achieve. Many thanks to all the club members who have participated and helped expand the ideas that I have had. Our wives still wonder why meetings last till after 11 p.m. some nights.

Have I learned anything? Hell, YES.

I learned that you can have some of the brightest, most eager, and most willing people around, but without leadership or someone to take charge, nothing really ever does get done. Please visit our Web site for more information about our club — please visit [www.qsl.net/w8ccj]. 75

## NEVER SAY DIE

*continued from page 4*

### Visit New Hampshire

This could be the last time you'll have an opportunity to see one of the world's most magical fall leaf displays. Drive up for a few days in early October. Or fly into Manchester and rent a car. Zip on up I-93 to Franconia Notch and take a ride on the Tramway, visit The Flume, and the Foot Basin. Stop by Clark's Trading Post and put a quarter in an old music machine.

### Waging Peace

Well, it's about time, isn't it? We've been waging war after war after war. WWII, the Cold War, the Korean war, Vietnam (including Cambodia), Somalia, Bosnia, Panama, Haiti, Grenada, Guatemala, the Gulf War, Afghanistan, the war on poverty, the war on drugs ... you fill out the list. Now we're facing another with Iraq, which could escalate into Syria and Iran, plus a few other Moslem countries.

Is there any solution to this whole mess? Of course there is, or I wouldn't have brought it up.

As Stan would say, "A nice mess you've gotten us into, Ollie."

One way to solve problems is to look for places where similar problems have been solved before.

One of the most basic problems that needs to be solved is to get a few billion people jobs that pay more than a dollar a day. They need to be able to feed their families and have a place to live. I don't have one magic bullet for this, but I do see several ways the U.S. can get the ball rolling ... and do very well rolling it. Hey, everyone has to benefit, right?

What I discovered during my visit to New Caledonia was a sneaky way to stop people from fighting. My visit to Singapore showed me how to get a basket-case economy into high gear in fairly short order. And my visit to Yugoslavia clued me in on another road to peace.

Basically, what I propose our doing is getting the people in Third World countries to become consumers ... making things and selling them. This could work for us big-time in Afghanistan, where we screwed up beyond all recognition after we helped the Afghans defeat the Russians. Even worse, the experts predicted exactly what would happen that led to the Taliban taking over. I wrote about it at the time.

Having spent a couple weeks in Afghanistan (YA1NSD), I have a fair understanding of the country.

The country is strategically located for an oil pipeline from the Crimean oil reserves to the Indian Ocean, which is what most of the fighting has been about. For that matter, the 9/11 attack provided a beautiful opportunity for us to get control of Afghanistan. Bush couldn't have asked for a better excuse.

As an aside, I'm sure anxious for someone to come along and market some cold fusion-powered products so we can start putting the oil, coal, natural gas, and power companies out of business. It's going to happen eventually, and we'll see a new trillion-dollar industry springing up. It's about time we put Saudi Arabia out of business. And Iraq, Iran, and a few other oil producers. Remember that it was the Saudis who gave us 9/11, and who spawned and funded bin Laden.

Having published scientific papers by some of the world's leading physicists, plus all of the patents so far issued in the field, I know what's going on and the players in the cold fusion field.

So what's step one in waging peace?

The hams in New Caledonia explained that when the French arrived there the native tribes had been at war with each other for hundreds of years. Instead of going in and killing 'em, the French set up TV stations. The natives had to stop fighting long enough to get jobs so they could buy a TV set for their families. Then they had to keep on working so

*Continued on page 61*



## Solar Flares

*Solar activity will be at moderate to low levels early in the month, with a nice run of Good (G) propagation days expected from the 5th through 9th. Several Fair (F) days are likely to precede and follow this period, so all in all we should see pretty decent DXing conditions for about a two-week stretch.*

The second half of October looks like it will be pretty dismal, however, with only one Good (G) day and three Fair-to-Good (F-G) listed on the calendar. The 14th through 19th is likely to have numerous moderate flares, causing frequent ionospheric disturbances. The last four days of the month show a potential for some of the largest solar events of 2002, so look for several CMEs and/or X-class flares. They could produce a large proton event between the 28th and 31st if any of them are Earth-directed. The positive side of this is that spectacular auroral displays are likely to be visible across Canada and the northern U.S.

Following behind the equinox that occurred last month, seasonal effects will continue to be at their most favorable. Notwithstanding the daily forecast mentioned above, this time of year historically favors us with Good to Excellent propagation on 10, 15, and 20 meters during the day. Fair to Good conditions on 20, 30, and 40 meters at night, and Fair conditions on 80 and 160 meters, also at night. The lower D and E layers of the ionosphere are now less strongly ionized during the day and will quickly disappear after sunset, giving us stronger signals and more stable skip across the board. Hurricanes between the Tropics of Cancer and Capricorn will still be around, though, causing some trouble on the lowest frequencies, but continental thunderstorms will have all but left us except for the occasional disturbance along the Gulf coast.

As mentioned earlier in this article, X-class flares may occur around the end of the month. These are the strongest flares on the "alphabet soup" scale that also includes the B, C, and M classes. Some folks are a bit sketchy about what all this is about, so here is a brief explanation. Each step up in class represents a successive order of magnitude, which means that each class is ten times stronger than the one below it. Therefore, an X-class flare is around a thousand

October 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
		1 F	2 F	3 F	4 F	5 G
6 VG	7 G	8 G	9 G	10 F	11 F	12 F-G
13 F-G	14 F-P	15 F-P	16 F-P	17 F	18 F-P	19 F-P
20 F-G	21 F	22 F	23 F-G	24 F-G	25 G	26 F
27 F-P	28 P	29 P	30 VP	31 VP		

EASTERN UNITED STATES TO:													
GMT:	00	02	04	06	08	10	12	14	16	18	20	22	
Central America	15/17	17/20	17/20	17/20	17/20	15/17	15/17	10/12	10/12	10/12	17/20	10/12	
South America	15/17	15/17	20	30/40	30/40			10/12	10/12	12/15	17/20	12/15	
Western Europe	30/40	30/40	17/20	17/20				10/12	10/12	12/15	17/20	17/20	
South Africa	20/30	40	20/30	20/30					10/12	10/12	12/15	12/15	
Eastern Europe	17/20	30/40	40/80	40/80	30/40			15/17	10/12	15/17	15/17	17/20	
Middle East	20	20	20						10/12	10/12	15/17	15/20	
India/Pakistan	17/20	17/20						15/17					
Far East/Japan	10/12		17/20				17/20	17/20			15/17	10/12	
Southeast Asia	15/17		17/20	17/20			17/20	15/17	10/12			15/17	
Australia	10/12	17/20	20	20	20	30/40	30/40	17/20				10/12	
Alaska	10/12		20				17/20	20			15/17	10/12	
Hawaii	10/12	12/15	17/20	17/20	20/30	20/30	17/20	17/20				10/12	
Western USA	20/30	20/30	20/30	30/40	30/40			10/12	10/12	10/12	15/17	17/20	
CENTRAL UNITED STATES TO:													
Central America	15/17	15/17	17/20	17/20	20/30			10/12	15/17	10/12	10/12	10/12	
South America	15/17	15/17	20/30	20/30	17/20			10/12			10/12	12/15	
Western Europe								12/15	12/15	12/15	17/20	17/20	
South Africa			17/20	17/20					12/15	12/15	15/17	17/20	
Eastern Europe	30/40	30/40	30/40						12/15	12/15	17/20	17/20	
Middle East	20	20							15/17	15/17	15/17		
India/Pakistan	15/17	17/20						12/15	12/15				
Far East/Japan	10/12	12/15	17/20	17/20	17/20		17/20	17/20				10/12	
Southeast Asia	10/12		15/20	17/20					10/12	10/12			
Australia	10/12	15/17	15/17		17/20	20/30	30/40	17/20			12/15	10/12	
Alaska	10/12	12/15	17/20	17/20	20		17/20	17/20				10/12	
Hawaii	12/15	15/17	17/20	17/20	20/30	30/40	17/20		10/12	12/15	12/15		
WESTERN UNITED STATES TO:													
Central America	10/12	12/15	15/17	17/20	30/40				10/12	10/12	10/12	12/15	
South America	10/12	12/15	15/17	17/20	17/20						10/12	10/12	
Western Europe	17/20				17/20			17/20	17/20	20	20	20	
South Africa	17/20	20		20						10/12	12/15	12/15	
Eastern Europe	17/20	17/20							15/17	15/17	17/20	17/20	
Middle East	20								15/17	15/17	15/17	20	
India/Pakistan		15/17	17/20						12/15	15/17			
Far East/Japan	10/12	10/12	12/15	17/20	17/20	17/20			17/20			15/17	
Southeast Asia	10/12	10/12						17/20	15/17	17/20			
Australia	10/12	12/15	15/17	15/17	17/20	17/20	17/20						
Alaska	10/12	10/12	15/17	17/20	17/20	17/20		17/20	17/20			15/17	
Hawaii	10/12	10/12	12/15	15/17	20/30	20/30	30/40		12/15	10/12			
Western USA	20/30	20/30	30/40	30/40	30/40			10/12	12/15	12/15	15/17	17/20	

**Table 1. Band, time, country chart.** Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



times more explosive than a paltry B-class flare! Also, within each class, there are nine subdivisions (numbered 1-9) delineating further gradations in flare strength, so a C5 flare is 1.5 times stronger than a C1.

The lower category flares, the Bs and low Cs, occur almost every day and barely garner any attention. The X-flares occur only a few times each year and are major events that can trigger planet-wide radio blackouts or long-lasting radiation storms. The large flares of July 20th and 23rd this year caused widespread R3 (strong) radio blackouts as well as hazardous conditions for the power transmission, pipeline, airline, and space industries. For more information on the effects of solar flares see the "User Groups" at [http://www.sec.noaa.gov/SWN/index.html].

Until next time, Happy Halloween and 73!

## Band-by-Band Summary

### 10 and 12 meters

Again, much of the globe should be workable during daylight hours. For best results, work from east to west as the day progresses. Try Europe before noon, Africa and the Middle East shortly after noon, and Central or South America after that. Late in the day you should pick up the South Pacific and other areas of the southern hemisphere for a few hours, but signals will fade quickly after sunset. Check the morning and evening gray-line paths over the poles for contacts in Asia. Daytime short-skip operate over distances between 1,000 and 2,000 miles.

### 15 and 17 meters

Excellent worldwide openings are likely to be available with the best opportunities in the southern hemisphere. Europe will peak before noon, but most other areas don't begin to open up until after mid-day. The best signals will still be from Central and South America, but strong openings can be found to both Africa and the South Pacific. Short skip will typically range from 1,000 to 2,000 miles.

### 20 meters

Good DX can be expected all day, from sunrise through the evening hours. Peak periods will be shortly after sunrise, again in the late afternoon, and sometimes in the early evening. West and Central Africa can provide unusually strong signals at this time of year, so try to fill in some of the countries missing from your DX log. The same is true for the South Pacific and Asia. Short

skip can range from 500 miles during the day up to about 2,100 miles at night.

### 30 and 40 meters

Good worldwide DX opportunities can be found between sunset and sunrise, particularly into the southern hemisphere. Central and South America will be your mainstays, but Europe and the South Pacific will have their moments in the limelight. West-coasters will probably have trouble with Europe but can make up for it by working the South Pacific, Australia, and Indonesia. Skip distances can be from 750 miles to over 2,000 miles at night, but are limited to under 1,000 miles during the day.

### 80 and 160 meters

These bands are finally coming into season with decent worldwide DXing available from sunset through sunrise. Tropical storms may still limit activity here, but when they subside some strong European signals can be heard from the East Coast, and strong South Pacific or New Zealand stations can be picked up from the West Coast. Short skip will vary from less than 1,000 miles in the daytime to over 2,000 miles at night. 73

## NEVER SAY DIE

*continued from page 59*

they could buy the stuff being advertised on TV. And that was the end of the tribal warfare.

So let's set up TV stations around Afghanistan and start broadcasting. That'll take a lot of steam out of the warlords as their recruits quit to get jobs. What jobs? I'll explain that, too.

One way to generate jobs is to encourage entrepreneurialism. This has worked out fabulously in India where there are groups providing micro-loans to people so they can start their own businesses.

### Warning?

We're all aware of the collapse of investments. First savings and loans, then e-companies, and now Enron, WorldCom, et al. The Wilshire 5000, which tracks every publicly traded U.S. company, hit its peak in March 2000. Since then the market has lost over \$7 trillion in value, and over a thousand major companies have gone out of business.

That's 41% of the value of all traded stocks going pfft in 28 months!

Alan Greenspan and Dubya assure us that our economy is sound. With almost half our people's savings gone, the sound I hear is an echo. An echo of 1929's

dull thud, when Hoover also assured the country that the economy was basically sound.

This fiasco resulted in Roosevelt being elected in 1932, taking us off the gold standard so the Fed could issue all the paper it wanted on a "trust us" basis, trying to paper our way out of the depression. It took WWII to finally get things moving again. I'm not sure how our making trillions of dollars of war materials and destroying them rebuilt our economy, but it did.

Well, it got us used to having our taxes taken out of our paychecks instead of paying the government off once a year. It got us used to so-called Social Security, where our money was also taken out of our paychecks so it could be immediately spent by Congress, replaced by their IOUs. They still haven't explained where the money will come from to repay all those IOUs. But, at least they're beginning to worry about it. Thanks.

We also got used to wives having to join the workforce so families could make ends meet. Today two family members working earn less in real dollars than one did before WWII.

Okay, so what does all this mean?

Well, with a thousand companies out of business and the others busy downsizing, it's going to be more and more difficult for wage earners to find wage sources. With an average stock market loss of about \$30,000 per family, people are obviously going to be buying less stuff, putting stuff manufacturers and retailers out of business. This could, at least, put a stop to the projected HDTV conversion and the yearly upgrading of personal computers.

### The Iraq Mess

Let's see now, are you in favor of our attacking Iraq and getting rid of Saddam? Or do you think it's a bad idea? If you've read *Black Hawk Down* (or seen the movie), you're unlikely to be much in favor of the war. Or you may have a firm belief in peace.

With Saddam signing alliances with Syria and even Iran, and with our allies looking away nervously when we ask them to join us, the situation is looking messy.

On the other hand, a recently defected Iraqi nuclear physicist testified that Saddam can be expected to have built two or three nukes within three years. And that's if he hasn't already managed to buy a few from ex-USSR sources.

Saddam's next step is obvious ... hide one in downtown Manhattan or Washington and threaten to use it if the U.S. causes him any trouble. This would give

*Continued on page 62*



## NEVER SAY DIE

*continued from page 61*

him all the time he needs to set up a massive biological attack on America.

Or we can all pray that Planet X will wipe out Saddam for us. Prayer really does work, you know.

### Gunned Down

I told you what happened in Australia when the government confiscated people's guns. Mugging and home break-in statistics went through the roof.

Well, how safe would you feel if you posted a sign on your lawn guaranteeing there are no guns in your house?

The situation in England is another example of what can happen when the anti-gun fanatics get control. In London, the chances of being mugged are six times higher than in New York City, and we all know what a hell hole that place is these days. If you're not sure, take a walk in Central Park some evening. Let me know if you live to tell about it.

In 1997 the Brits outlawed the owning of firearms. Armed robberies last year are up an estimated 212 percent.

Worse, the government outlawed the carrying of any article which might be used for self-defense, and that has included knitting needles and walking sticks.

A homeowner held two burglars at bay with a toy gun and called the police. They arrested him for using the imitation gun to intimidate the burglars.

How about the farmer who used his shotgun on two thieves who had broken into his home for the seventh time. He got a life sentence for killing one, 10 years for wounding the second, and an extra year for having the illegal gun. The wounded thief was out of prison in a year.

Are we headed in the same direction?

### Eating Disorders

Good grief, now Wayne's going to tell us how to eat! Well, I have to — because you're making a mess of it.

Yes, I know, you've been eating since year one, so what's there to know? You open your mouth, shovel it in, and eventually you've eaten.

Unfortunately, like most other skills, unless you've had a good instructor you're going to build up some really lousy habits that are going to be very difficult to break. And worse, the instructors you had (your parents) left nature to its course, so you're a prisoner of those early habits. The same thing happened to me, so the territory is familiar.

Now, Professor Green is about to upgrade your eating knowledge, and all based on reliable research. Look, you've got this fantastic machine your parents

made for you one night. It's enormously complicated and it has an unbelievably capable repair system built in. It's able to convert a wide variety of fuel into heat and the building material for a lifetime of maintenance.

So you sit down at a table, put food in your mouth, chew it, and swallow it. Case closed? Hmm, not quite. The fact is that there's this saliva stuff in your mouth which is a fundamental part of your digestive system. Chewing food just enough so you can swallow it will send it to the next part of the system before it's ready. Dr. Kellogg, a hundred years ago, had it right when he got people to chew every bite a hundred times before swallowing. Chew everything thoroughly before you swallow. Give the saliva a chance to do its part in your digestive system.

Yes, it takes longer to eat. I used to be a gap and swallow eater; now when I'm in a restaurant other groups come in, order, get their meals, eat, pay their check and are gone while I'm still sitting there chewing.

Chew your food. What's your damned hurry?

At home I listen to my tape of the previous night's *Coast to Coast* Art Bell radio show and assemble the pages of my books while I'm chewing. Or I'm cutting up fruit and vegetables for the next day. It takes a while to cut a watermelon into six quart containers. Or cut up some cantaloupes, oranges, and grapefruit.

Okay, now lesson two.

Once you've chewed everything up in a saliva bath you send it on to your stomach. Here it's doused with hydrochloric acid to further dissolve that junk you ate, mainly to satisfy your taste buds, and probably with little consideration for the fuel you should be supplying. So you pour down some water, tea, or coffee to dilute the acid so it can't do its job properly and the food is then forwarded on down the chute in only partially digested form. This means that your intestines won't be able to do their job of removing the nutrients right and the whole system is in trouble.

Your body does need a whole lot more pure water than you've been giving it, but not at meal time. Give the food an hour before you start the deluge. Give your digestive system a break, okay?

### More Amelia

If these groups who want to find Amelia Earhart's plane would bother to do some fairly simple investigation, they'd stop wasting their time and a ton of money.

One group, headed by Ric Gillespie, The International Group for Historical Aircraft Recovery, is investing \$600,000

in the search, going to Nikumaroro Island. Another, Nauticos Corporation, plans to spend \$3 million to \$4 million searching the ocean bottom in the Howland Island area. Still another, Dana Timmer's group, Head of Howland Landing, Inc., spent a million to hunt for the plane in 1999.

When writer Fred Goerner researched Amelia's disappearance, a six year adventure which culminated in his book in 1966, he went to the islands where Amelia had been reported to have been seen. And he did this with the Navy obstructing him every inch of the way.

As I've written before, Amelia was a good friend of my dad's. She kept her Lockheed at my dad's Central Airport, just across the river from Philadelphia and she had dinner at our house a couple times.

In 1936 her chief mechanic had dinner with us, explaining that he'd just finished installing special higher-powered engines, extra wing tanks, and cameras for her coming flight around the world. He said that President Roosevelt, who had been the Secretary of the Navy, had asked her to make a spy trip to take photos of the Japanese installation at Truk.

By a coincidence, when I was at the submarine rest camp in 1944 on Majuro in the Marshall Islands, the natives said that a plane had crash-landed there seven years earlier. The woman pilot was unhurt, but the man navigator had been injured. They said a Japanese ship picked up the two and their plane and took them to Saipan. This was the same story Goerner heard when he interviewed the Majuro natives about twenty years later.

When my sub stopped off for a couple days at Saipan to refuel I had an opportunity to ask the natives there about Amelia. They said that she'd been killed by the Japanese when the Americans were capturing the island, and that the Americans had burned her plane.

Again, Goerner got this same story when he visited Saipan.

I corresponded with Goerner about all this at the time and reported it in my editorials.

Why all the cover-up? Our government didn't want to admit that the most famous woman in the world had been recruited by Roosevelt as a spy. And the Japanese didn't want it known that they'd executed the most famous woman in the world. Still don't.

The next time you see a newspaper article about finding Amelia's plane, clue in the writer for me. Oh, and send me a copy of the clipping.

### More Drug Nonsense

While you were sleeping, the DEA's budget has grown from \$3.1 billion in

*Continued on page 64*



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Blood Purifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! \$10 (#01)

**Plant Growth Simulator:** This has the same circuit as the above, all ready to use. Postpaid: \$155 (#PGS).

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life

aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the *Drum*. \$5 (#10)

**Travel Diaries:** You can travel amazingly inexpensively - once you know the ropes. Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under \$1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. \$5 (#11)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. Yes, of course we pay for your articles! \$0 (#78)

**Wayne's Caribbean Adventures:** My super budget travel stories - where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it co-operatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

No, I'm not a nut case.  
**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngsters' IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gottschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system - the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)  
**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. As an iconoclast I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 100 Editorial Essays:** \$5 (#72)  
**1997 157 Editorial Essays:** \$8 (#74)  
**1998 192 Editorial Essays:** \$10 (#75)  
**1999 165 Editorial Essays:** \$8 (#76)  
**2000 101 Editorial Essays:** \$5 (#77)  
**2001 104 Editorial Essays:** \$5 (#78)  
**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Colloid Reprint.** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Clips.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)  
**Silver Colloid Kit:** \$25 (#80-98-99)

**Four Small Booklets Combined:** Dowsing: why and how it works; Super Organic Food: a trillion dollar new industry; Schools in 2020: another 5 trillion industry; Anthrax, a simple cure. \$3 (#86)

**Stuff I didn't write, but you need:**  
**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs - such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax - a capping blow for René's skeptics. \$25 (#92)

**Dark Moon Video:** 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon and wondered at their weird gate. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of give aways that the photos and films had to have been faked. With our gov't it seems to be just one cover-up after another. \$40 (#93)

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The 73 Flea Market, Barter 'n' Buy, costs you peanuts (almost) — comes to 35 cents a word for Individual (noncommercial!) ads and \$1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

**Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the December 2002 classified ad section is October 10, 2002.**

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## NEVER SAY DIE

*continued from page 62*

1982 to \$19.2 billion today. And the results? Daily headlines and TV exposés of DEA scandals, drug busts gone terribly wrong, and more drugs than ever being available.

The biggest beneficiaries of this Congress-instigated corruption are the Mafia, drug gangs, and a few Colombian multi-billionaires. The easy money in this enormously profitable business keeps inner city kids from being interested in education or honest work. That's for suckers.

And who are the patsies paying for this big scam? The rest of us. 73

**Say You Saw It In 73!**



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## QRX . . .

### Guest Editorial: 9/11 Remembered

I'm going to title this as an editorial. I'll also promise to keep it short.

We have all heard these words before: "September 11, 2001, is a day that changed all of our lives forever."

The pictures are still there in our mind's eye. The giant Boeing jets crashing into the World Trade Center.

The buildings crumbling to the ground. The fire at the Pentagon. The scorched earth in Pennsylvania.

And the other scenes. The ones known only to ham radio. Those of the radio amateurs from New York, Washington, and Pennsylvania who sprang immediately into action. The hams from across America who dropped everything, grabbed their HT and traveled, sometimes thousands of miles — paying

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article (IBM (ok) or Mac (preferred) formats), carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

## NEVER SAY DIE

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After hearing Mark Hazelwood on the Art Bell Show talking about Planet X arriving next year and raising hob, it took a while, but I finally managed to get a copy of his book, *Blindsided*. As I explained last month, Mark makes a very good case, complete with the details of world catastrophe predictions from 16 noted psychics.

Since the book had been so difficult to get, I called the publisher and ordered a stock of them. Now you can get a copy from Radio Bookshop for \$15 (item #94). Will the world as we know it come to an end next May? I'm not making any plans ... not because I'm discounting the prediction, but because I have so much going on that depend on things not being catastrophed.

However, what'll it hurt if you make sure you've got some reliable QRP equipment and a way to generate power? I like the idea of the micro-generators using old house fans. Read Tom Miller's great Microwind article in the December 2001 issue.

Me? Why think small? All I want to do is totally revolutionize our educational system ... which I plan to do with a publication as soon as I have a million to get it going. I want to put the NEA and our current public school system out of business. But then, I also want to put the present food industry out of business, including the agricultural giants and the sugar industry. Oh, and the pharmaceutical industry and their AMA puppets. Plus the nursing home and assisted living

industry. And about 75% of our hospitals. Plus, too, the oil, coal, and natural gas industries.

I see the best route to world peace through business and education. Using modern technology we can cut the cost of education by about 80% to 90%, making it affordable to the whole world. And by emphasizing the development of entrepreneurial businesses and the downplaying of international corporate giants, we'll see a better distribution of wealth ... and a lot less poverty.

Go ahead and laugh at me as a dreamer. Hey, I got bigger laughs back in 1970 when I predicted that the handful of repeaters we had then would eventually be a technology that everyone would be using. So I started a repeater journal, published hundreds of repeater-oriented articles in 73, ran repeater conferences, and organized a special hearing with the FCC commissioners which resulted in major rules changes. The end result are the cell telephones we see everywhere in the world today.

When the first microcomputer came along I got one. Wow! So I started publishing computer magazines such as *Byte*, *Microcomputing*, *Incider*, *Run*, etc., to help the innovators communicate their ideas, to attract newcomers to the field and bring them up to speed, and to provide a medium with which entrepreneurs like Steve Jobs and Bill Gates could reach potential customers with their products.

Right now I'm having a ball publishing *NH ToDo*, with the major goal of doubling

New Hampshire's tourist industry and thus making sure that we're not going to be affected by any recessions. My other goal is to get as many people as possible off their duffs and out having fun. I want to get 'em up into hot air balloons, into gliders, climbing mountains, scuba diving lakes, water skiing, snow skiing, kayaking, and so on.

I didn't learn to ski until I was 44, and now I love it! I usually ski with a group of hams, all of us keeping in touch with our HTs as we zoom down the slopes.

It's easy to learn to ski. I started out with a pair of short-short skis (2.5-foot long) and after four days of lessons I was charging down the local slopes without falling down. I then bought five-foot skis, and after a week of lessons I was skiing better than I ever thought I would in my life, even on the black diamond trails.

A sample copy of *NH ToDo* is \$3 from Radio Bookshop, if you want to see what I've been doing. This is a magazine that needs to be cloned in every state, and even in most of the larger cities. We need to pry people away from brain-free TV crapola. We need to get families out camping, picnicking, going to county fairs, and having fun. Parents have a responsibility to give their kids memories that they will never forget. You'll never forget your first hot air balloon ride. Or exploring a cave. Or mountain climbing.

I'd sure like to see more hidden transmitter hunts where

the hunters go out on foot rather than drive their cars. It's great fun organizing a hunt ... particularly if you have a fiendish turn of mind (like I do).

You say you're too old to ski? Baloney! Well, then, how about getting some snowboard lessons. They call that "Grays on Trays."

### Health (Again)

None of all this is any fun if you're not in good health ... which is why I've been doing so much research in that field. I've reprinted a bunch of my essays on the subject in my *Secret Guide To Health*. It's \$10 (#04) from Radio Bookshop. With our Department of Health telling us that only 1.5% of Americans are truly healthy, maybe it's about time to stop listening to "real" doctors (who only make money when you are sick) and start reading some of the books with the facts.

Are you still drinking tap water? Cheesh, what's it take to get the message through? In my *Secret Guide to Wisdom*, I have a review of Dr. Banik's book (p. 15). Dr. Allen E. Banik, M. D., who spent much of his life researching the effects of water on the human body, reported the following in his publication *The Choice Is Clear*: "The only minerals that the body can utilize are the organic minerals. All other types of minerals are foreign substances to the body and must be eliminated. Distilled water

Continued on page 40



continued from page 1

their own way — to become the second, third, and fourth wave of relief operators and volunteers.

No, ham radio was not on the front page of newspapers. Hams were not the lead story on the evening news. The tragedy of 9/11 was the story. The job of ham radio was to be the carrier of the message so that aid and comfort could be brought to the victims of this horrific and cowardly act of terrorism.

What 9/11 showed is that our loose-knit fraternity can come together when the need arises. That we may be called radio amateurs, but that we are communications professionals. That ham radio is there when it is needed.

On 9/11, ham radio did the job its people have trained themselves to do. The hobby has since moved on. So has our nation. But neither will ever be the same.

We pray that a tragedy like 911 never happens again.

Thanks to author Bill Pasternak WA6ITF, editor of and via Newsline.

## A New Kind of Battery

One of the most frustrating experiences for a photographer or a ham radio operator is to be in an acute situation that requires equipment to work properly and have the batteries powering the equipment go flat. For the photographer, it usually means a lost photo opportunity. To the ham radio operator assigned to provide communications during an emergency, it could be a life-and-death situation.

But power reliability could soon increase dramatically. Steve Crow K4CPX passes along word that the nation's largest photographic retailer, Ritz Camera, has announced plans to begin selling a new battery that can keep a camcorder or digital camera shooting away for half a day.

The new source of portable power is Electric Fuel Corp.'s Instant Power disposable batteries. Based upon Electric Fuel's zinc-air technology platform, the Instant Power camcorder battery connects to the camcorder through its DC jack and offers the user up to 10 hours of running time. Another model designed for digital still cameras offers upward of 12 hours of continuous operation time. As with the camcorder battery, the digital camera battery pack comes with a built-in belt clip and 3-foot cord. Both batteries have a five-year shelf life in the original sealed aluminum pouch and come complete with a 3-foot cord and an integral belt clip.

While not directly designed for ham radio needs and not a renewable source, the new battery could augment the needs of ham radio operators in emergency communications situations. And here's where amateur radio ingenuity comes in. If models are available that can directly, or through some home-built regulator adapter,

be made to power a 5 watt hand-held radio, an amateur working an emergency situation would have hours of power well beyond that of his radio's normal battery. And depending on how much he transmits, an Electric Fuel battery might run his HT for several days before requiring replacement. This also gives the possibility of extended operations for low power Field Day stations, QRP treks, and similar one-time operations. Best of all, it is a date it, put it on the shelf, and forget it power source, standing by for the next five years in case it is needed.

Electric Fuel also manufactures a smaller version of this battery technology for cellular phones and PDAs. You can find out more about this new power source and the technology behind it on the Web at [www.electric-fuel.com].

Thanks to K4CPX and Henry Feinberg K2SSQ, via Newsline, Bill Pasternak WA6ITF, editor.

## Boom in Toothpaste Sales Predicted

Donnie Osmond, the former KA7EVD, is helping to bring a legendary television game show back to the small screen. Osmond is host of *Pyramid*, a syndicated revival of the game shows created and hosted by Dick Clark in the 1970s and '80s.

According to Los Angeles ham radio lore, Osmond was reportedly mentored into ham radio in the early 1980s by the late Art Gentry W6MEP. This, when Osmond and his sister were taping the *Donnie and Marie Show* at the Golden West Studios in Hollywood. Gentry, who was employed there as a broadcast engineer, is best known for his development of the FM repeater — a device that changed the way most hams operate on the VHF and UHF Amateur Radio Service bands. He and his wife Millie K6JJN, were also mentors to many Los Angeles youngsters wanting to enter ham radio.

Thanks to USA Today, via Newsline, Bill Pasternak WA6ITF, editor.

## Frequency — the TV Show

New Line Cinema is considering spinning off the movie *Frequency* into a TV series. This is the film in which the nonham hero uses his dad's old ham radio equipment to communicate with his now-deceased father.

The movie was a great public relations boon for amateur radio. If New Line Cinema proceeds, a TV show could help put the words "ham radio" in the mind of every man, woman, and child in the US of A.

Thanks to W6AQ, via Newsline, Bill Pasternak WA6ITF, editor.

## History of MARS

The Military Affiliated Radio System (MARS) has provided an inexpensive link for U.S. service personnel stationed abroad. MARS operators in the states have provided telephone "patches" for decades. MARS stations in the Vietnam combat zone allowed our military there to have access to HF long distance capability for staying in touch with their families back in "The World."

The U.S. Marine Corps Historical Division is seeking input from both military and civilians who served as part of the MARS program through arranging phone patches or relaying MARS-grams. Both oral and written accounts are welcome.

The main focus is on Navy/Marine Corps MARS during the Vietnam era, but all contributions from all services and eras are solicited. Artifacts such as photos of stations and personnel also are being collected for an exhibit. Those who would like to contribute should E-mail [MARS@borgmangroup.com] or write Borgman Group, 3342 South Sandhill Rd., Suite 9-326, Las Vegas NV 89121.

Thanks to the North Florida ARS Balanced Modulator, Sept.-Oct. 2002.

## A Battery Can Become a Time Bomb

Jump-starting a battery is a common procedure, but never take this job for granted or you could be seriously injured.

A battery can turn into a bomb while it is being boosted. A lead acid, wet cell battery generates increased hydrogen and oxygen when it is being charged. All it takes to set off this explosive combination is a spark from static electricity, a cigarette, or the booster cable connection itself.

Here's how to correctly boost a battery:

- Always wear safety goggles to protect yourself from acid and fragments in case of an explosion. It's a good idea to store safety goggles with your jumper cables.
- Check to see if the battery is really dead, or if the terminals and clamps might just be corroded.
- Restore correct fluid levels to the battery. If you are dealing with the more recent sealed type of batteries, it is not always possible to restore these fluid levels. If this is the case, the battery should be replaced.
- Make sure the battery is not frozen. Trying to jump a frozen battery could result in an explosion.
- The electrical systems of both vehicles must be the same voltage and both must have a negative ground. Mismatched batteries are less likely than they were 20 years ago, but six-volt batteries are still in use today. Using a 12-volt battery to boost a six-volt battery could cause the six-volt battery to explode.
- Park the vehicles close together, but not





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touching. Put both vehicles in "park" or in "neutral," with parking brakes set.

- Turn off the engine and any electrical accessories, including interior lights on both vehicles.
- Remove the battery vent caps to allow any previously built-up gas to escape, then cover the holes with a damp rag or replace the caps.
- Do not lean over the battery at any time.
- Connect the red clamps to the positive "+" posts of each battery. Reverse connection causes a battery explosion hazard.
- Connect one black clamp to the negative "-" terminal of the good battery.

• Connect the other black clamp to a good ground: a clean, unpainted spot on the engine, frame, or body of the disabled vehicle, placing it as far away as possible from the battery. This will prevent sparks from occurring in the vicinity of any explosive gases.

• When connecting the clamps, do not allow them to touch any other metal. This would not only cause a spark which could trigger an explosion, but it could destroy parts of the vehicle's electrical and computer system.

- Start the vehicle with the good battery.
- Start the disabled vehicle.
- Remove the cables in reverse order.
- Detach the "-" cable first from the disabled car's frame.

• Then take the "-" off the good car's negative terminal.

- Remove the disabled car's "+".
- Then remove the live car's "+" connection.

Other tips:  
• Avoid any sparks or open flame. This means no smoking.

• Additional PPE (personal protective equipment) such as a face shield, rubber boots, or special rubber gloves may be required under various circumstances.

• Check battery fluid regularly, and keep terminals and clamps free of corrosion. Make sure your battery is in good condition for cold weather driving, when a weak battery may prove inadequate for starting your vehicle.

• Some of the causes of dead batteries are obvious, such as leaving your lights on. But if you are not sure, take your car to a garage and find out what caused it to go dead in the first place.

Hopefully you won't have to boost any batteries soon, but if you do, follow these guidelines to prevent an explosion. And one more thing: Make a copy of this page and put it in the glove compartment — just in case an inexperienced driver in the family runs into trouble.

Thanks to Radio Flyer, the U\*BE\*T ARC newsletter, Nov. 1997.

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# LETTERS

## From the Ham Shack

**Parker Cope W2GOM/7, Prescott Valley AZ.** The article "This Thing Called Wire-Wrap" (August 2002) missed a few points: how many turns are needed, how much wire needs to be stripped, and how the turns are put on the post.

The answers in reverse order are: The unstripped (insulated) part of the wire is held next to the post, the bare wire is fed up through the wrap barrel, the barrel of the tool is placed over the post, and the tool rotated around the post. When all of the bare wire is wound on the post, the tool can be removed, leaving the wrapped bare wire on the post.

The length of wire for one turn on a 0.025-inch post is about 1/8 of an inch. Therefore, for three turns, 3/8 of an inch is enough, a half inch is more than enough.

Three turns are all that are needed to make a gas-tight connection, but I shoot for four turns. Five turns aren't too bad either.

I've known techs to touch the wrap with solder after everything is checked out, but that is overkill. The phone company has millions of wire-wrap connections of just wire-wrapped on the post and no solder. They don't have any problems. Wire-wrapping is the way to go.

**Gordon West WB6NOA, Costa Mesa CA.** Steve Nowak's "Top Secret" column ("On the Go," June, page 39) was right on target. The June issue of *73 Magazine* re-confirms my dedication to amateur radio and emergency preparedness, as well as my frustration with those organizations and individuals who specialize in nit-picking new ideas to help our amateur service grow and become a larger part of the emergency communications response.

Bill Pasternak did a great job in summarizing some of Wayne's gripes about "not invented here" when it comes to the American Radio Relay League. They truly do not open themselves up for suggestions, new ideas, or working with the troops down in the trenches.

Here's a case in point that coincides with topic (B) in Steve Nowak's "On the Go" column, where he says "... have a positive attitude ... most hams were quick to offer help ... one, though, launched a dissertation as to why this would be illegal since it supported the hospital's business ...":

I had the exact same thing happen to me and our city volunteer communications

group when our ATV disaster preparedness activities became well known throughout Southern California. Our local ARRL director responded precisely with the (B) statement ... "since it supported the ... business of ..." Like you, I don't think any emergency group has a "normal business" that would include disaster or an attack.

But our director goes further to write in his local newsletter: "... in our zeal to provide emergency/disaster relief communications, let's not lose sight of the true nature of amateur radio as a volunteer, noncommercial service free of pecuniary interests for the benefit of ourselves or our employers. We head down a slippery slope when we subvert the carefully crafted rules in Part 97 to accommodate Part 74 or Part 90 operation, such as public safety airborne video, in the amateur bands ..."

The ham radio pilots who fly our local public safety helicopter don't get any pay for sending down voluntary ATV communications, nor are these paid pilots possessing a valid ham license using onboard ham TV for ANYTHING other than transmitting directly to our ham volunteer group on the ground. They can monitor their own ATV transmit frequency before transmitting, they have ATV 2-meter liaison frequency capability, they ID two different ways almost continuously, they transmit only to a volunteer ham station on the ground when asked to, and their volunteer ATV activities in no way earn our local city any money that might violate "pecuniary interest" rules.

The local Southern California ATVers are all very positive about our program because we are rapidly creating more ATVers on the ground who regularly check into their repeater nets. The local ATVers in Southern California are in full support of our disaster preparedness drills that might last a whopping 5 minutes a week on ATV simplex 426.250 MHz. Their only disappointment is not being able to see the picture more than 20 miles away simplex, and the rather shaky picture when we try to squawk through an ATV 1.2 GHz cross-band repeater thousands of feet higher than our local police helicopter.

Until we developed our ATV program with our local city communications division, there wasn't much that our local ham radio volunteers might offer that the city did not already have. In other words, before our ATV efforts, our local city had little for us to do that would work into their emergency

preparedness plan. Yikes — if a local ham radio group gets an official position on a city emergency preparedness plan, does this mean we are again violating the rules? Are we facilitating the normal business of that city by being part of the emergency preparedness plan? Should we only offer our voluntary services to ONLY voluntary groups where no one in that group gets paid a salary, or certainly no ham as part of that group gets some scoots?

Does this indeed mean that the well-respected local hospital disaster communications group may also be subverting the rules by giving their local hospital backup communications in case of a phone outage or nearby disaster? Maybe so, and there are probably thousands of ham radio emergency operators who may be "guilty" of getting in close with local emergency agencies to help provide backup communications.

Gosh, does ARRL President Jim Haynie want to rethink his encouragement for hams to work in the homeland security efforts?

As the *ARRL Rule Book* so clearly indicates, it's up to the emergency communicators to decide for themselves where the line is drawn between "facilitating the regular business of" and providing emergency comms to a local city, county, or state emergency service. The *ARRL Rule Book* illustrates some of the questions asked about cooperating with the National Weather Service and providing storm spotting and strategic weather reports for them from the field. Oh, my gosh — are we subverting the rules again here?

Like you, I don't think so. It's time for those hams sitting on the sidelines or up on a pedestal acting as radio cops themselves to get down here "in the trenches" and see what it's like to work closely with a municipality that will indeed use our services when disaster strikes. That's a relationship I think that all hams are trying to promote so that we may be of SERVICE during times of emergency, rather than a bunch of untrained "wannabes" standing around with nothing more than an HT and a battery pack that might last for two hours.

All we need to do is take out the *ARRL FCC Rule Book* and look at the basis and purpose of our Amateur Radio Service, Part 97.1(A): "Recognition and Enhancement of the Value of the Amateur Service to the Public as a Voluntary Non-Commercial

*Continued on page 58*



# Your Turn for a Coil Winder

*The Gingery Universal Coil Winder can be an easy — and handy — addition to your bench.*

*My 1942 Radio Master Catalog shows that for the sum of \$4.35 — about a day's average wage at the time — you could buy a Morris Deluxe Coil Winder. According to the advertising copy, you could wind honeycomb, spider web, and solenoid coils equal in appearance to factory-made coils with this marvelous tabletop machine.*

Unfortunately, the Morris Coil Winder and its competitors are now found only at antique radio auctions. But, David Gingery has rescued those of us who enjoy winding our own coils. His 24-page booklet, *Build a Universal Coil Winding Machine*, provides a step-by-step illustrated guide that enables anyone with even modest metalworking skills to

construct his own coil winder. Gingery writes with a simple, direct style and every part is illustrated with clear, dimensioned drawings. Gingery assumes that the reader possesses only moderate skill and provides detailed fabrication and assembly instructions.

I'll take you through my construction of his design, including some modifications that I believe improve his design.

## How it works

Place a hollow tube coil form on the threaded spindle (9; see **Photo B**) and tighten the conical mandrels to hold it in place. Put a spool of magnet wire on the wire holder (8), thread the wire under the spindle, over the top of the wire guide and attach it to the coil form with a bit of tape or glue.

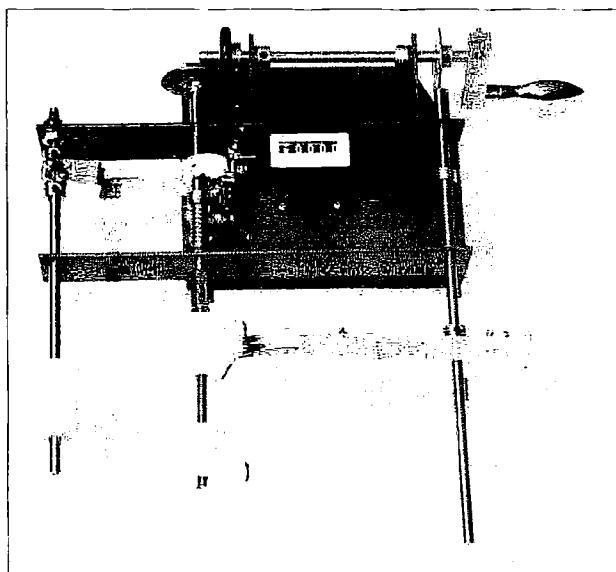


Photo A. Completed Gingery coil winder.

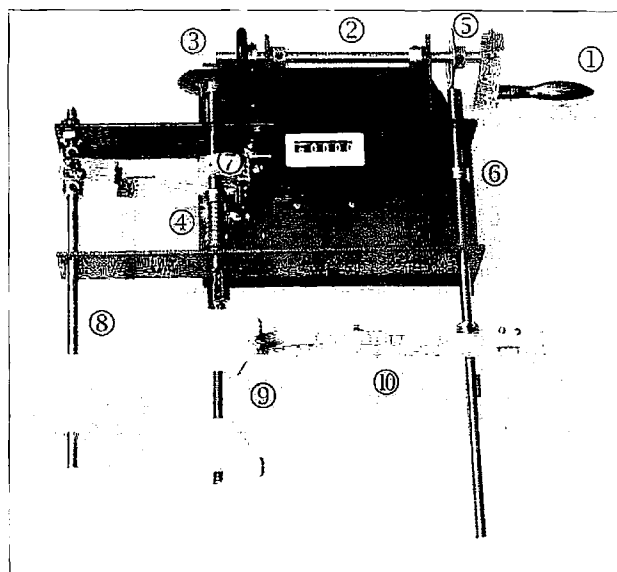


Photo B. How the coil winder works.



Turning the crank (1) revolves the drive shaft (2), which in turn drives the spindle through the rubber tire and disk mechanism (3), causing the coil form to revolve and take up the magnet wire. Disk mechanism (3) is held against the rubber tire by spring (4). Simultaneously, cam (5) causes cam follower rod (6) to oscillate back and forth. The wire guide (10) tracks the movement of the cam follower rod (6), thereby causing the wire to follow a universal winding path on the coil form.

With every revolution of the spindle (9), cam (7) trips a lever that advances the digital counter, thereby displaying the number of turns wound on the coil.

It's also possible to guide the wire by hand for close-wound or space-wound solenoid coils.

For anyone unfamiliar with what a "universal wound" coil is, look at the ubiquitous 2.5 mH radio frequency choke. A single turn of wire is wound at an angle to the inductor axis, with additional turns wound on top of each other. This introduces space between adjacent turns, thereby reducing self-capacitance and increasing the frequency at which the choke is self-resonant. Each section in the 2.5 mH choke is "universally wound."

### Necessary tools and parts

The author says that the coil winder can be built with only an electric drill and common hand tools, such as a hacksaw and propane torch, and that a drill press and lathe will be helpful, but not necessary. I used a metal cutting band saw, milling/drilling machine, and a lathe, and found that these tools speeded up the project and allowed me to make a more finished appearing project. Although it might be possible to build the coil winder without a drill press, I wouldn't recommend it for anyone with below average metal-working skills. If you don't have access to a metal cutting band saw, stop by the hardware store and pick up a couple fresh blades for your hacksaw.

All the parts described by Gingery are readily available, and most can be found at a well-stocked hardware store. I found that some parts, such as the 1/4-inch shaft collars and fender

washers, were much cheaper to order in quantity from an industrial supply house. The "extras" that I added, such as a more professional counter and the revolving handle, will likely be available only from an industrial supply house. (See Notes for a possible supplier.) The only slightly unusual part required in Gingery's design is a rubber tire from a sewing machine bobbin rewinder. A quick trip to the local sewing machine repair store quickly provided one for a buck.

It's critical that the various rotating and oscillating shafts be straight, smooth, and held to a tight diameter tolerance. Quarter-inch-diameter drill rod is a good inexpensive choice. Standard hot rolled or cold rolled rods of the type found at most hardware stores are likely to be unsatisfactory. Likewise, it's essential that the holes through which the rod fits be round, smooth, and very close to — but not under — 0.250 inch in diameter. It's almost impossible to assure these criteria with a simple twist drill, so I drilled the bearing holes with a 1/4-inch twist drill, and followed up with a 0.252-inch chucking reamer. A reamer leaves the hole round and smooth, and the extra 0.002-inch diameter provides enough clearance for easy operation without a sloppy fit. This is an expensive tool, nearly \$20, so you might wish to consider alternatives, such as very careful work with a smooth round file.

### Construction and changes

I decided to use an inexpensive mechanical counter instead of the hand tally counter used in the stock design. To accommodate the larger mechanical counter, I increased the spacing between the cam follower rod and the spindle by 1 inch. This increase carries through in the base and the drive shaft lengths.

Gingery suggests that base be made from 3/4-inch-thick wood. Since it's important that the base plate surface be flat, I used a piece of 3/4 inch medium density fiberboard (MDF). Over the space of a few inches, MDF is remarkably flat; I measured flatness variations of only 0.001 inch in my base plate, much superior to either raw

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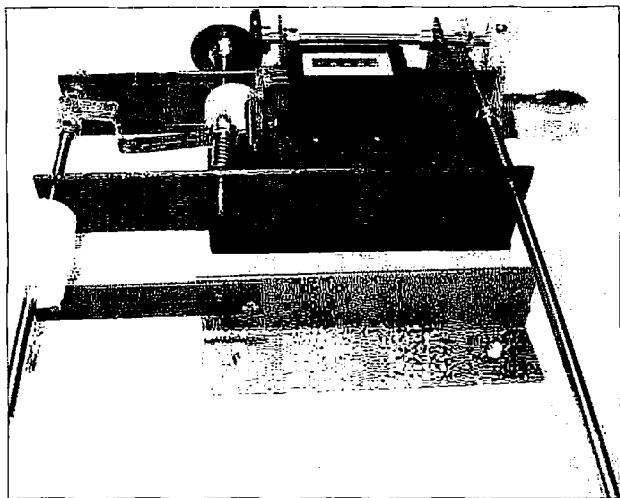
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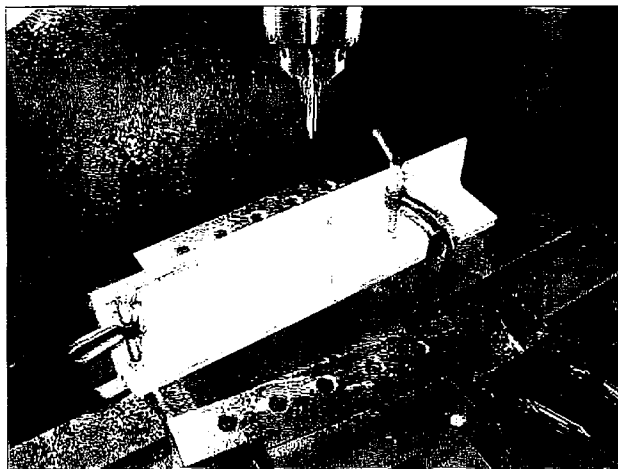
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*Photo C. I didn't use the strap extensions proposed by Gingery.*



*Photo D. To ensure the bearing holes are aligned, clamp the two pieces of angle together and drill simultaneously.*

plywood or other wood products. MDF's dimensional accuracy and stability aid the overall accuracy of the completed project.

In Gingery's design, components are attached to the base plate with no. 8 x 3/4-inch wood screws. Since I knew that I would be assembling and disassembling the winder as I tinkered with my modifications, I substituted threaded inserts commonly used in furniture work. This enables the components to be held in place with 10-24 flat head or button head machine screws. To help retain the threaded inserts in the MDF, I filled

the hole with epoxy after screwing in the insert.

The main body of the winder is made from 1-1/2-inch steel angle. Gingery shows the wire holder shaft supported by an extension made from 3/4 x 1/8-inch flat iron, secured with a single 8-32 screw. The extension strap is prevented from rotating by the spindle rod. I made the winder body and extension following Gingery's details and found it didn't work. The extension support strap rotated and bound the spindle, preventing it from rotating. A single 8-32 screw did not provide enough friction to prevent rotation and caused a "guillotine" effect against the spindle, even with only a small roll of magnet wire on the support.

I revised his design by substituting a single piece of 1-1/2 angle. To preserve Gingery's concept, I cut one leg of the angle out. **Photo C** shows Gingery's original design and my revised approach. If you don't have a metal band saw it isn't necessary to cut out the angle leg. In this case, I would consider extending the base plate to run the total length of the steel angle.

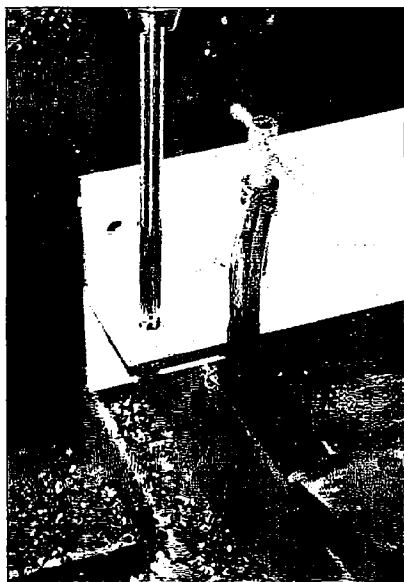
I used black hot rolled angle from the hardware store. I recommend scrubbing off the oil and loose scale with a wire brush and solvent, followed by a coat of a light color metal primer, so that you can accurately mark out the work before doing any drilling.

Since it's critical to align the bearing holes, I clamped the two main angle pieces together and simultaneously drilled the holes. I cleaned up each pair of holes with the 0.252-inch reamer immediately after drilling.

Gingery suggests that the cams and drive disk be made by brazing shaft collars to fender washers. I found that soft solder worked well, as long as the joint was cleaned and fluxed. Don't use rosin core electrical solder here; this calls for the stuff you find in the plumbing department!

Another weak part of Gingery's design is the friction drive mechanism. His booklet shows the friction between the rubber tire and the drive disk regulated only by the degree of compression of the rubber tire. Although it worked when I built it, I found it difficult to get exactly the right degree of compression. This mechanism also makes adjusting the drive ratio unduly complicated. Accordingly, I added a stiff compression spring and shaft collar so that the spring sets the drive friction. If you are not going to use the winder for an extended period, release the spring tension. At the bearing end of the spring, I added a sandwich of two stainless steel washers and a nylon washer to stop the spring from chewing into the angle. **Photo F** shows the revised drive assembly.

I also added nylon washers to the two shaft collars that bear against the angle. The rough iron would otherwise



*Photo E. After drilling the bearing holes, I reamed them with a 0.252-inch reamer.*



provide a poor friction bearing against the smooth shaft collar.

My decision to use a different mechanical counter also required changes in the lever, cam, and counter mounting portions of Gingery's design. I had a small block of *lignum vitae* left over from another project and used it to make a mounting block for the counter. *Lignum vitae*, although wood, can be milled and tapped almost as if it were metal. I milled the block to fit the space between the two angles and milled the top and bottom parallel and flat. It is held in place by two aluminum angle brackets. The activation cam follower is made from a piece of 1/2-inch-wide aluminum, 0.050 inch thick, bent to fit. The activation cam is a small length of 1-inch Delrin® round stock, drilled approximately 1/4 inch off-center and drilled and tapped for two 4-40 set screws. The cam follower pulls the spring supplied with the counter. It's not good design practice to directly press upon the activation arm, as a jam could damage the mechanism. Pulling the spring limits the force that can be applied to the counter to a safe limit.

Gingery's plans call for the wire guide to be made from a series of folded sheet metal structures. I had serious difficulty making the required creases and bends, so I instead used a combination of aluminum angle and plastic pipe. I started with 1 inch x 1/8-inch-thick aluminum angle and milled it to the particular leg dimensions shown in Gingery's design. Gingery assumes that the wire guide will be made of a solderable material, and fortunately I was able to use special aluminum solder where soldering was required.

The wire guide has two semicircular sections at its nose and tail. I was able to make the nose section from a thin piece of brass following Gingery's instructions, although it isn't the most attractive piece of metalworking that I've ever built. I completely failed making the larger tailpiece. My substitute was a small section of 1-1/2-inch PVC pipe, with a shallow groove that I turned in the lathe with a 60-degree threading tool. I then made a support

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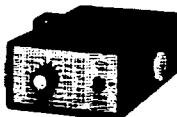
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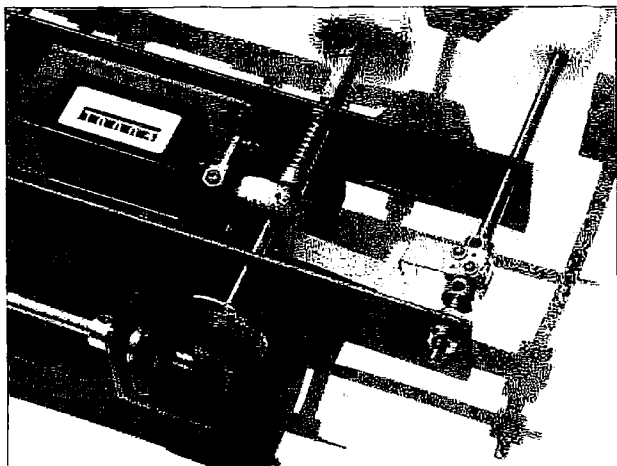


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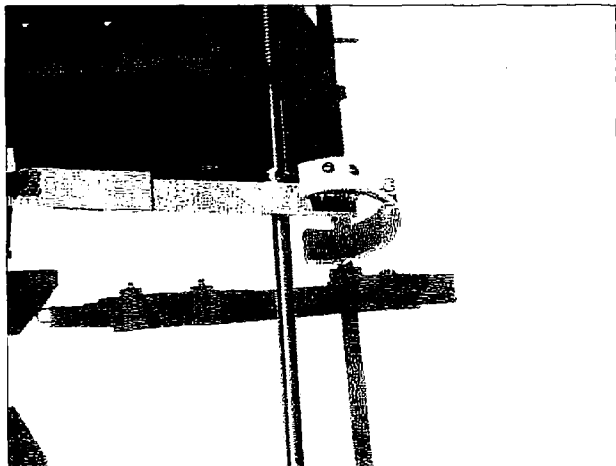
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*Photo F. Revised drive tire and disk.*



*Photo G. Revised wire guide.*

piece from a length of 1/2-inch-square aluminum bar stock. It's important that the wire guide groove not damage the wire insulation, so I sanded it with fine grit sandpaper.

Using a 1/4-inch support rod for wire spools with a 1-inch inner core diameter caused erratic drag. To correct this, I made an accessory wire spool holder from a short length of 1-inch Delrin round stock.

I made two sets of mandrel cones, one for small coils with 1-inch diameter Delrin, and one from 2-inch diameter Delrin for larger coils. It is necessary to thread the cones for the 1/4-20 spindle. Most 1/4-20 taps are too short to completely thread all the way through the larger cone, so I used an undercut tap. If you don't have a lathe, don't worry; Gingery provides an alternative cone construction technique.

The final special touch I added to the coil winder was a revolving handle, attached to the drive shaft with a short section of 1/2-inch aluminum bar. Since the handle must be removed to change cams, I used a split cotter, clamped with a 4-40 screw, to secure the aluminum bar to the drive shaft.

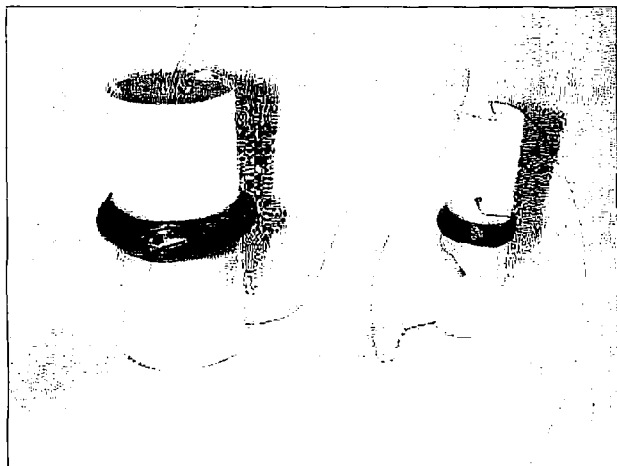
#### **Winding coils with the coil winder**

After cleaning, priming, and final painting, I reassembled the coil winder and wound a few test coils. Gingery provides a brief description of operation and offers a couple suggestions for coil winding. I found this an area where additional information would be beneficial.

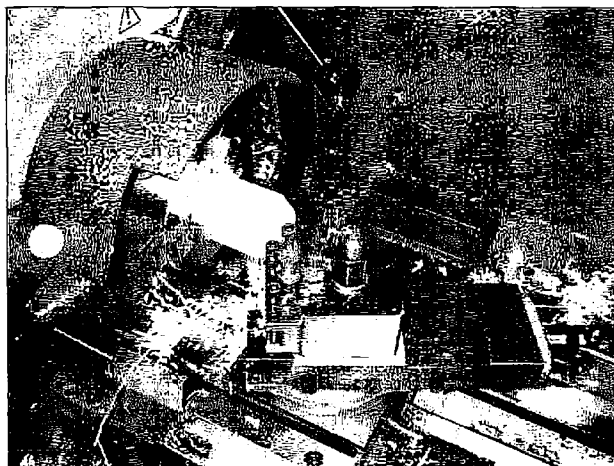
I started with a paper tube, formed from several layers of standard typing paper, glued together and wound on

top of a small length of 1/2-inch-diameter steel rod. After the glue set, I slipped the form off the rod. To secure the ends of the winding, I punched small holes through the tube at either end.

I then secured the paper tube coil form between the two smaller cones, threaded my no. 34 A.W.G. enameled magnet wire through the wire guide and started to crank the handle. After three or four turns, I had a mess. The wire slid back and forth over the smooth paper core and wouldn't take the side-to-side form — there wasn't enough friction between the slick enameled wire and the smooth paper core. I tried an old trick of dissolving a block of musician's rosin in denatured alcohol and painted the sticky mixture on the core and allowed it to dry a bit. Success! The rosin-coated core



*Photo H. Sample coils.*



*Photo I. Turning the large mandrel cones.*



gripped the enameled wire and the proper universal shape started to appear after a dozen or so turns of the crank. At this point, the enameled wire's slipperiness reasserted itself and the lack of turn-to-turn friction became a problem. I wound up painting the coil every ten turns or so with more of my rosin/alcohol mixture. After winding a coil, I allowed the rosin mixture to set up and then painted the coil with Q-dope. The result was a sort-of-OK coil. You would never mistake it for a professionally wound coil, but I believe that a bit of practice and experimentation with the ratio between coil revolution and guide oscillation, wire drag, and wire guide position should help.

If you use rosin-alcohol mixture, keep it away from the wire guides, as these must remain smooth and friction free. I didn't appreciate this at first and had to scrub off stray rosin droplets from my wire guides with denatured alcohol. Even a small bit of rosin in the wire guide caused enough excess friction to break the small gauge wire after a turn or two.

I also tried another trick from the early days of radio — beeswax. A trip to the local arts and crafts store yielded a lump of beeswax and a package of wood "Popsicle sticks." I scraped a small piece of beeswax onto one of the wood sticks and softened it with a few seconds blast from a heat gun. I then coated the paper core with a thin layer of softened beeswax and added more wax every few turns. When the coil was finished, I melted more beeswax onto the outer layers. I also experimented

with a soft wax product called "Florist's wax" or "Florist's adhesive" that can be applied without heating. The chief drawback of the soft wax is that it never sets up and thus quickly picks up dirt. Either of these is less messy than my rosin/alcohol mixture.

Gingery points out the difficulties of winding universal coils with enameled wire and suggests using

cotton- or silk-covered wire for the best results. The fabric insulation has enough friction to form the proper universal coil shape. It's tough to find fabric-insulated wire in small gauges these days, but it's necessary for a professional looking result. For low frequency work, Litz wire should be used if maximum Q is desired.

*Continued on page 54*

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*Table 1. Parts available from MSC.*



# Multiple CW Filters

*Here are some clear descriptions and examples of how you can set up an active audio filter.*

*It's possible for your ear to sort out a single CW tone, but a very narrow CW filter makes it easier. While a narrow IF filter is ideal, they are expensive and difficult to install. A narrow, steep-skirted off-board audio filter is an attractive alternative. An active multipole audio filter is easy to build and much easier to install than an IF filter.*

**R**ealistically, an audio filter is not quite as good as an IF filter because of the limited dynamic range of the product detector that produces the beat note: A big signal within the IF bandpass, but outside the audio filter's bandpass, can cause desensitization. That limitation is a small price to pay for the cost and convenience of a good multipole audio filter.

Most audio filters are simple single pole affairs and their shape factor, a ratio of 3 dB bandwidth to 30 dB bandwidth, leaves something to be desired. When the peak response is at 800 Hz and the 3 dB bandwidth is 100 Hz, the 200 Hz bandwidth is only down about 7 dB. That is, a signal at 700 Hz or 900 Hz is only down about 7 dB. Still loud enough to be aggravating.

To improve the shape factor requires a multipole filter. Every pole in the filter causes an attenuation of 6 dB for every doubling of the bandwidth. The response of a two pole filter falls 12 dB for every doubling of the bandwidth, a three pole filter attenuates the double bandwidth 18 dB, and a four pole filter offers 24 dB of attenuation at the double bandwidth.

Audio filters can be either active or passive. Passive filters use inductors and capacitors to achieve their selectivity, but multipole LC filters require inductors with high Qs. Active filters on the other hand use resistors, capacitors, and op-amps. With the introduction of IC op-amps, active filters became the filter of choice, even though they require power and can be overloaded.

different center frequency or bandwidth.

For the single pole filter shown in Fig. 1, with design criteria of  $f_c = 800$  Hz,  $B = 100$  Hz,  $G = 1$ ,  $C1 = C2 = 0.01$   $\mu$ F, the Q calculates to be  $800/100 = 8$ . The open loop gain of the op-amp at 800 Hz must be greater than  $2Q^2$  or 42 dB. An inexpensive LM741 can fill this bill. The design equations are:

$$\begin{aligned} R1 &= Q/(2\pi f_c CG) = 159.2k \\ R2 &= Q/[(2\pi f_c C)(2Q^2 - G)] = 1253 \\ R3 &= 2Q/(2\pi f_c C) = 318.3k \\ C1 &= C2 = C = 0.01 \mu F \\ G &= R3C2/[R1(C1 + C2)]. \\ \text{When } C1 &= C2, G = R3/2R1. \end{aligned}$$

Q is  $1/\delta = f_c/B = 8$ ,  $f_c$  is the center frequency of the stage in Hertz, 800 Hz, B is the bandwidth of the stage in Hertz, 100 Hz, and G is the voltage gain of the stage, one. All the resistors strongly affect bandwidth but R2 affects  $f_c$  as well.

A multipole filter is made up of several single pole filters, each with a different bandwidth and center frequency. But, as the number of poles increases, the Q of the filter's sections increase and the gain required of the op-amp increases, and the component tolerances become more critical. However, 1%

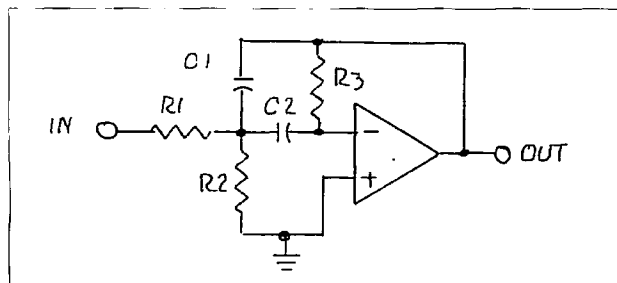


Fig. 1. A single pole active filter uses one op-amp.

A single pole active bandpass filter is shown in Fig. 1. It only takes three resistors and two capacitors. The design equations for the active bandpass filter are given to allow you to choose a



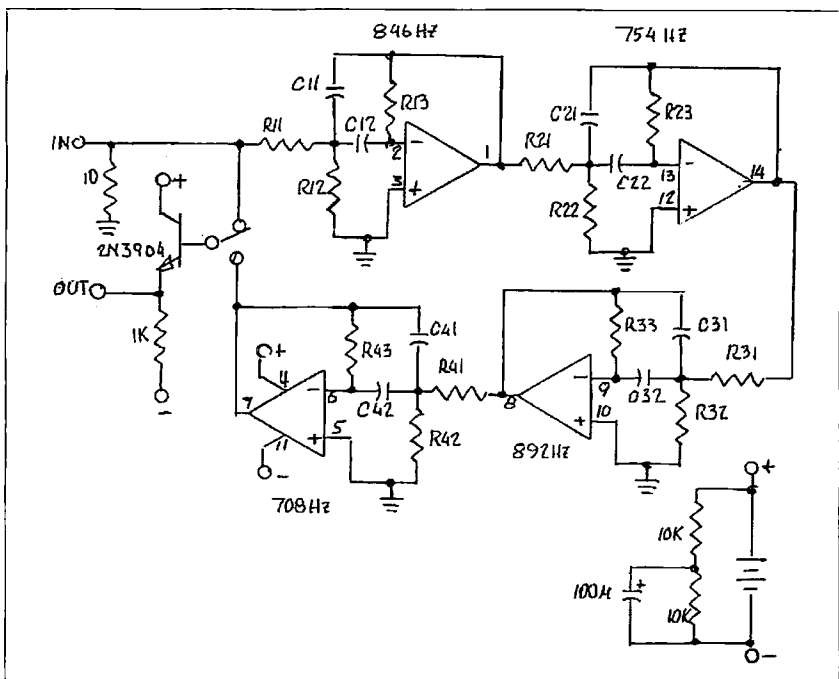


Fig. 2. A staggered quadruple active filter has excellent off-frequency response.

tolerance resistors (RN55 or equal) are satisfactory and 2% polyester capacitors (Xicon PFA103F and PFA104F) are available that can fill the bill.

A multipole filter can be considered as a stagger-tuned amplifier. A two pole filter is a staggered pair, a three pole filter is a staggered triple, and a four pole filter is a staggered quadruple.

The shape factor, typically the ratio of the 60 dB bandwidth to the 6 dB

bandwidth, is determined by the number of poles. The frequency response of a number of cascaded stages tuned to the same frequency has the same shape as a single stage even though the bandwidth shrinks. That is, the overall 3 dB bandwidth will shrink by the same factor as the 12 dB bandwidth. For example, two cascaded synchronous stages have a 3 dB bandwidth that is approximately 64% of that of a

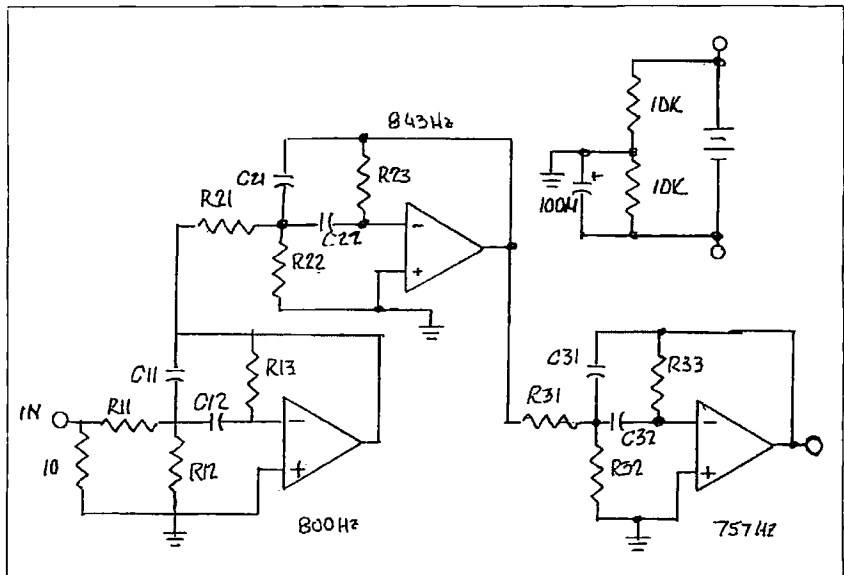


Fig. 3. A staggered triple is an option.

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	Two stages at $f_0 \pm 0.92B_0$	0.19 $\delta$

Table 1.

STAGE	$f_0$ (Hz)	Q	R1 ( $\Omega$ )	R2 ( $\Omega$ )	R3 ( $\Omega$ )	C ( $\mu$ F)
1	846	16	30.1k	59	60.4k	0.1
2	832	42.1	75k	21	150k	0.1
3	708	42.1	95.3k	26.7	165k	0.1
4	754	16	34k	66.5	68k	0.1

Table 2.

STAGE	$f_0$ (Hz)	Q	R1 ( $\Omega$ )	R2 ( $\Omega$ )	R3 ( $\Omega$ )	C ( $\mu$ F)
1	846	17.6	33.2k	53.6	66.5k	0.1
2	892	46.3	82.5k	19.1	165k	0.1
3	708	46.3	105k	24.3	210k	0.1
4	754	17.6	37.4k	60.4	75k	0.1

Table 3.

STAGE	$f_0$ (Hz)	Q	R1 ( $\Omega$ )	R2 ( $\Omega$ )	R3 ( $\Omega$ )	C ( $\mu$ F)
1	800	8	15.8k	124	31.6k	0.1
2	843	16	30.1k	59	60.4k	0.1
3	757	16	33.64k	64.9	66.5k	0.1

Table 4.

single stage, and the doubled bandwidth also shrinks to 64%. Cascading stages doesn't improve the shape factor. Stagger-tuning does.

A multipole filter or a stagger-tuned amplifier has a number of stages, each tuned to a different frequency and each with a different individual bandwidth. For example, the two stages making a staggered pair are tuned to  $f_0 \pm 0.35B_0$ , each with a dissipation of 0.71 $\delta$ , where

$f_0$  is the center frequency, the 3 dB bandwidth is  $B_0$ , and  $\delta$  is  $B/f_0$ .  $\delta$  is 1/Q. A flat staggered pair centered at 800 Hz, then, is made up of two stages, one tuned to 835 Hz and one tuned to 765 Hz, each with a Q of 11.26. Flat staggered just means there is no ripple in the pass band.

Increasing the Q or increasing the stagger frequencies introduces ripple in the pass band and in the process improves the shape factor somewhat, but ripple in the pass band tends to cause ringing. I don't find the ringing noticeable when the ripple is 1 dB or less.

When the bandwidth is very narrow the filter will ring. The high Q of the narrow band circuit is the culprit. The single crystal filters common in years past rang like a bell when they were in their sharpest positions. Broader multipole filters with sharper skirts overcame the ringing problem yet retained the selectivity.

When the Qs of multipole filters are increased slightly, the rejection of off-frequency signals is greater than that obtained with a flat staggered filter. Increasing the Q by 10% over the flat staggered Qs is hardly noticeable except for the improved selectivity.

Increasing the number of poles sharpens the skirts of the filter and improves the shape factor. A flat staggered triple made of two stages staggered at  $f_0 \pm 0.43B_0$  of dissipation 0.5 $\delta$  and one stage centered at  $f_0$  with bandwidth  $B_0$  is shown in Fig. 3. The response at twice the 3 dB bandwidth is down about 18 dB. Not bad, but the price of an active quadruple filter is so low, you should go for the extra stage.

A flat staggered quadruple made up of four stages is shown in Fig. 2. Two stages are tuned to  $f_0 \pm 0.46B_0$  of dissipation 0.5 $\delta$  and two stages tuned to  $f_0 \pm 0.92B_0$  and dissipation of 0.19 $\delta$ . The flat staggered response at twice the 3 dB bandwidth is down about 24 dB from the peak.

A 10% overstaggered quadruple centered at 800 Hz with a 3 dB bandwidth of 100 Hz would have a signal at 700 Hz or 900 Hz reduced by 30 dB, practically gone.

For a flat staggered 800 Hz quadruple, the Q of two of the sections are about 42.1. The open loop gain of the

op-amp making up the filter pole should be considerably greater than  $2Q^2$ . Therefore, the open loop gain of a stage with a Q of 42 should be greater than 71 dB. Inexpensive quad op-amps like the Maxim MAX4492ASD or TI's TLC074 have a gain bandwidth product of 10 MHz, and the gain at 1 kHz is about 80 dB.

Four-pole audio filters aren't difficult to build: A single quad op-amp like the TLC074 or MAX4492ASD and a dozen resistors and eight capacitors is all it takes. The Qs required in multipole filters will be relatively high and as a consequence the component tolerances become rather critical. Resistors with 1% tolerance (RN55s or equal) and 2% capacitors with polyester films by Xicon (0.01  $\mu$ F, PF2A103F, and 1  $\mu$ F, PFA104F) are fine. Since capacitors are more difficult to find, practical values of C are chosen for the design and the appropriate resistors calculated.

The center frequency is rather arbitrarily chosen to be 800 Hz because our hearing is most acute at about 800 Hz. But certainly a different center frequency can be used. The audio bandwidth chosen is also rather arbitrary.

In choosing the bandwidth you must consider the stability of the transmitter and receiver as well as the bandwidth of the signal if the signal is to stay in the 100 Hz pass band. The stability of modern transceivers are seldom a problem, but stability isn't always certain. Needless to say, the filter is not tunable, so when you decide on a frequency and bandwidth, that's it.

While a quadruple is an excellent filter and economical in that it uses all four of the op-amps in a package of four, you can make a two pole (staggered pair) or three pole (staggered triple) filter. It depends on what op-amps you have available. The shape factor improves when the number of poles is high.

The tuning and Qs for some n-uples are given in Table 1. The center frequency is  $f_0$ , overall bandwidth is  $B_0$ , dissipation is  $\delta$ , and stage Q is 1/ $\delta$ .

A quadruple made of four stages is shown in Fig. 2. The values given in Table 2 are for a flat staggered quadruple centered at 800 Hz with a



bandwidth of 100 Hz. The quadruple is made with four stages tuned to different frequencies and with different bandwidths. The resistances given are the nearest 1% values.

The order of the stages is not important, but the loading on the last stage can limit the maximum open loop gain. The values given above produce a filter with no ripple in the pass band. Improvements in selectivity can be obtained by overstaggering, increasing the Q slightly. For example, increasing the Qs by 10% changes the resistor values as shown in Table 3. Increasing C reduces the resistance values, and the lower resistance values reduce the effects of the op-amp's offsets.

A staggered triple uses three op-amp stages and the response is not quite as good as a quadruple, but it's still pretty good. The Qs aren't as high as those required by the quad and the filter is less sensitive to component variation. The lower Qs means op-amps like the LM324 or LM741 with lower gain bandwidth can be used. The tuned frequencies of a triple are one stage at  $f_0$  with bandwidth of  $B_0$ , and two stages at  $f_0 \pm 0.43B_0$  with a dissipation of  $0.5\delta$ . A triple is shown in Fig. 3. The tuning and Rs and Cs of the stages making up a staggered triple are shown in Table 4.

Again, overstaggering the triple by increasing the Q slightly will increase the ripple in the pass band and improve the shape factor. The octave bandwidth (200 Hz) will be down about 24 dB when the bandpass ripple is increased to about 0.5 dB compared to 18 dB for a flat staggered triple.

A staggered pair that uses just two op-amps will have a poorer shape factor than a staggered triple. The response falls off at 12 dB per octave of bandwidth, but requires lower Qs and is more tolerant of component variation. The stages of a staggered pair are

STAGE	$f_0$ (Hz)	Q	R1 ( $\Omega$ )	R2 ( $\Omega$ )	R3 ( $\Omega$ )	C ( $\mu$ F)
1	835	9.01	16.9k	107	34k	0.1
2	765	9.01	18.7k	115	37.4k	0.1

Table 5.

tuned to  $f_0 \pm 0.35B_0$  each with a dissipation of  $0.71\delta$ . The tuned frequencies and RCs are shown in Table 5.

Overstaggering a pair narrows the 12 dB bandwidth and increases the ripple in the passband. With about 1 dB ripple in the passband, the octave bandwidth (200 Hz) will be down about 14 dB. Not a great improvement, but every little bit helps. A staggered pair is shown in Fig. 4.

The output of the filter can't drive a pair of earphones without some help, so a 2N3905 emitter follower is used to generate the necessary power to the phones or a small speaker.

A switch to bypass the filter switches the input from the filter to the emitter follower. The output of the receiver is terminated in  $10 \pm 10\% \Omega$  to hold the difference in level somewhat constant as the input is switched between the emitter follower and the filter. A switch to bypass the filter allows you to search the band more rapidly and maybe find that rare one and then switch in the filter to clear out the clutter.

Switching the base of the emitter follower between the filter's input and output doesn't require much isolation in the switch because the gain of the filter is near one, and coupling from the filter's output back to the input through the wiring capacitance or

switch isolation isn't likely to introduce oscillation.

The op-amp should be operated from a split supply for the op-amp to handle bipolar signals. Therefore, returning the non-inverting inputs of the op-amp to a virtual ground that is mid-way between the positive and negative supplies will allow filtering bipolar signals. Since there is no current into the non-inverting inputs, a bypassed resistive divider across a single supply can provide relative plus and minus supplies. A 9 volt battery will work if you can't steal a little current from the receiver.

A quadruple will clean up most of the stuff you hear and not cost an arm or a leg, either. The parts can be obtained from Mouser Electronics, 1-800-346-6873, 956 N. Main St., Mansfield, TX 76063 for under \$15.

A receiver with only an SSB filter doesn't make for the best CW reception, but adding a four pole audio filter changes the complexion completely. It can even improve a receiver with a decent 500 Hz CW filter. 73

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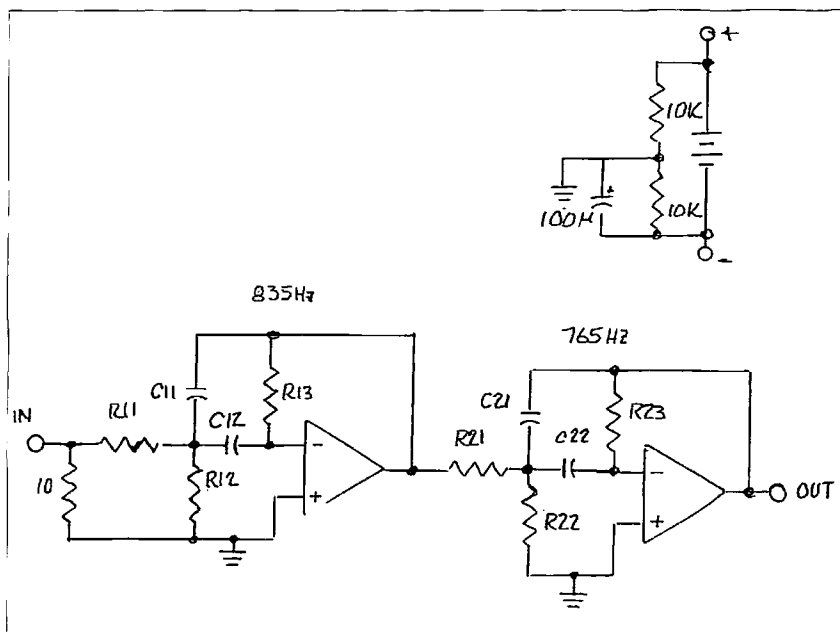


Fig. 4. A staggered pair is tolerant of component variations.



# Automotive Battery Voltage Monitor

*Interesting to analyze, simple to build.*

The circuit in Fig. 1 is useful for monitoring the voltage on an automotive or other battery. The design has three LEDs that light up individually to measure the charge on the battery powering the circuit. The resistors R2, R3, R4, and R5 as shown on the schematic set the low threshold voltage at 11V and the high threshold voltage at 15V.

The outputs of the LM339 (U1) are open-collector. When the voltage at a non-inverting input of a comparator is greater than the voltage at the inverting input, the output

of that comparator is high-impedance. If the non-inverting input voltage is less than the inverting input voltage, the output is low. R1 and D1 set the reference voltage for all of the comparators at

approximately 5.1V. The outputs of U1A and U1D both go low when the output from the voltage divider formed by R4 and R5 is less than 5.1V. R4 and R5 have been chosen so that this happens when  $V_{bat}$  is less than 11V. The outputs of U1C and U1B go low when the voltage divider formed by R2 and R3 produces a voltage greater than 5.1V. This happens when  $V_{bat}$  is greater than 15V. When U1D is low, the under-range LED (D4) turns on. If U1C is low, the over-range LED (D2) is illuminated. U1A and U1B have their outputs wire-ORed. Therefore, if either U1A or U1B is low, Q2 is off and the in-range LED (D3) does not glow. When U1A and U1B both have high-impedance outputs, R6 pulls the base of Q3 high and the in-range LED is turned on.

## Theory of operation

The values of R4 and R5 determine the low threshold voltage of 11V, while the values of R2 and R3 determine the high voltage threshold of 15V. These limits can be changed by varying the resistors in the voltage dividers. The voltage divider formula for R4 and R5 is given by:

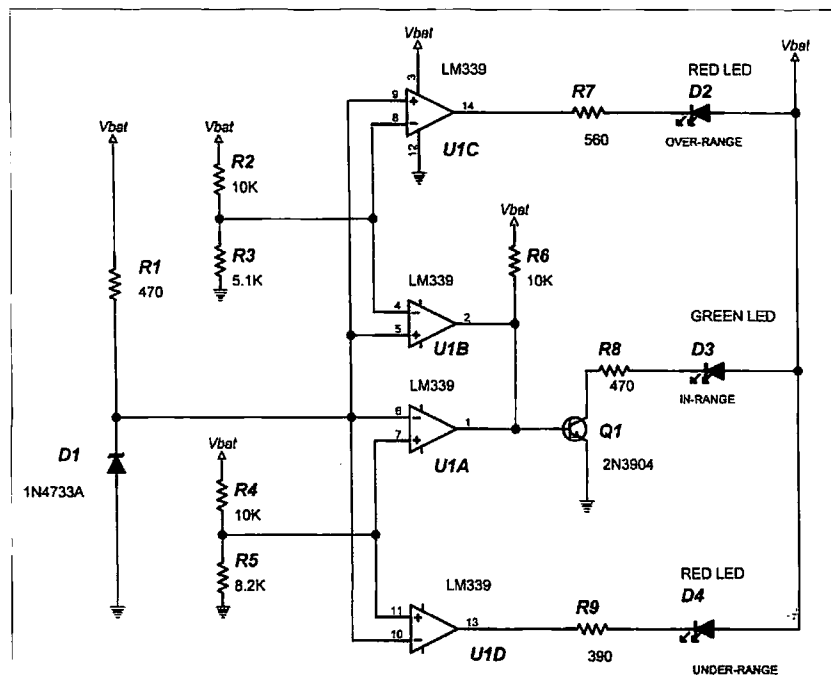


Fig. 1. Automotive battery voltage monitor. Note: All resistors are 1/4W 5%. When  $V_{bat} < 11V$ , D4 is illuminated. When  $11V < V_{bat} < 15V$ , D3 is illuminated. When  $V_{bat} > 15V$ , D2 is illuminated.



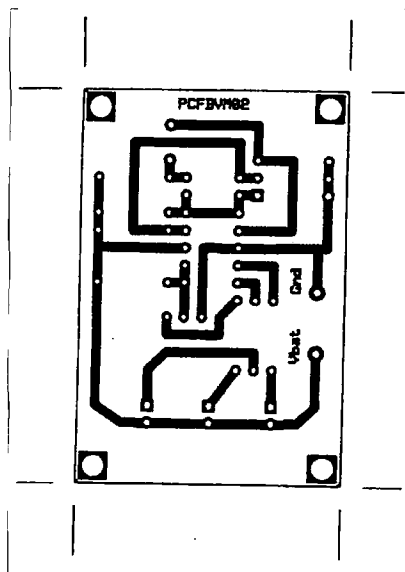


Fig. 2. 1x PCB positive artwork.

$$V_{out} = V_{bat} [R5 / (R4 + R5)]$$

$V_{out}$  is the voltage at the node where R4 and R5 connect. R4 is arbitrarily picked to be 10k.  $V_{out}$  must equal 5.1V when  $V_{bat}$  equals 11V. Solving the voltage divider equation for R5 yields:

$$R5 = R4 / [(V_{bat} / V_{out}) - 1] \approx 8.6k$$

R5 is chosen to be 8.2k, the closest standard 1/4W 5% resistor to 8.6k. Solving the voltage divider equation for  $V_{bat}$  with R5 = 8.2k, R4 = 10k, and  $V_{out} = 5.1V$  gives a  $V_{bat}$  threshold voltage of 11.3V. If more accuracy is desired, a

1/4W 1% resistor of 8.66k may be used. To determine the value of R3 necessary for the 15V high threshold voltage, use the equation:

$$R3 = R2 / [(V_{bat} / V_{out}) - 1] \approx 5.1k$$

where  $V_{bat} = 15V$ , R2 = 10k, and  $V_{out} = 5.1V$ .

Solving for these parameters results in R3 = 5.15k, so a 5.1k 1/4W 5% resistor is used.

If the threshold voltages are changed, the LED current limiting resistors must also be changed. Desired LED current is 20 mA. If a low threshold voltage of 6V is used R9 as well as R5 must be changed. The calculated value is  $R9 = (V_{bat} - V_{led}) / I$ , where  $V_{led}$  is the LED forward bias voltage drop (2.1V) and I is the desired current. This gives  $R9 = (6V - 2.1V) / .02A = 195 \text{ Ohms}$ . The closest 5% resistor is 180 Ohms. For the high voltage threshold, R7 is changed in a similar fashion. R8 is calculated with  $V_{bat} = (V_{highthreshold} - V_{lowthreshold}) / 2$ .

### Construction

Fig. 2 shows the 1x positive artwork for the printed circuit board. Once the board has been etched, the text on the solder side should read "PCFBVM02", not its mirror image. The mounting holes of the PCB are 1/8 inch in diameter. The diameter of the holes for D1

Name	Description
R1, R8	470 $\Omega$ (all resistors 1/4 W 5%)
R2, R4, R6	10k
R3	5.1k
R5	8.2k
R7	560 $\Omega$
R9	390
D1	1N4733A
D2, D4	Red LED
D3	Green LED
Q1	2N3904
U1	LM339
—	14-pin socket
—	Hookup wire

Table 1. Parts list.

are .04 inch, and the remaining holes are .031 inch in diameter. Solder the components to the circuit board as shown in Fig. 3. Component values are referenced in Table 1. Use a socket for U1 and don't forget to install jumper JP1. Be sure to observe polarity when mounting D1 and the LEDs. Solder a black wire to the Gnd pad and a red wire to the  $V_{bat}$  pad. Insert U1 into its socket.

### Conclusion

Apply voltage to the circuit with an adjustable power supply. Sweep the

*Continued on page 54*

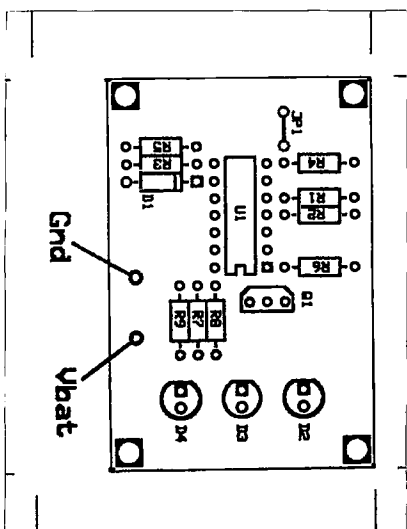


Fig. 3. Component placement.

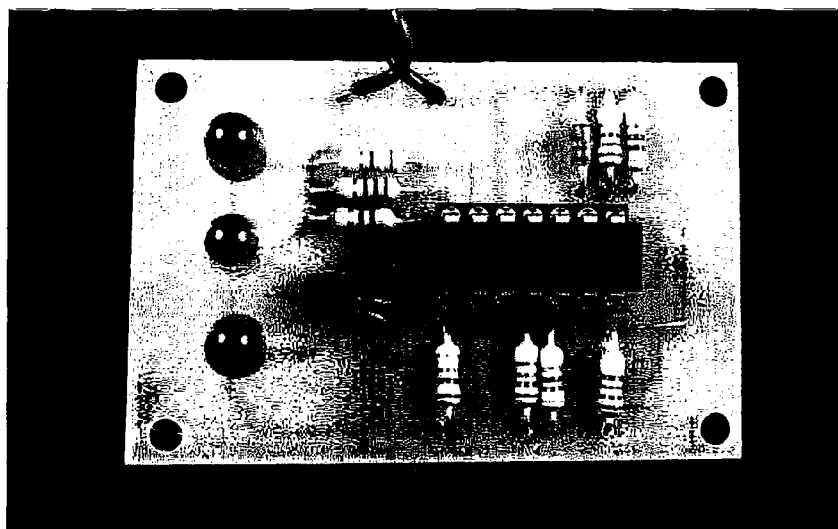


Photo A. Automotive battery voltage monitor.



# Travels with Henryk — Part 9

*CQ de Havana.*

*I have visited both Cuba and the Dominican Republic twice. It was interesting to compare amateur radio in these neighboring countries. Cuba is separated from Hispaniola, the island shared by Haiti and Dominican Republic, by the narrow Windward Passage. Basically, the islands have a very similar climate, geography, and history. Present-day societies in these countries are, however, organized differently, and these differences are also reflected in our hobby.*

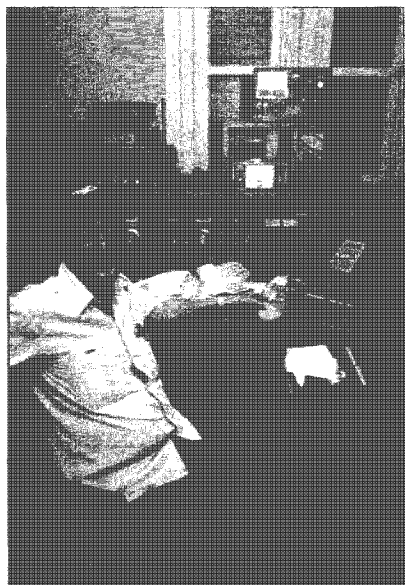
One of my guides to amateur radio in Cuba was Antonio (Photo A). He is a professor of medicine and has both equipment and antennas that are above the average in Cuba. His vintage gear was brought from Angola, Africa, by Cuban troops in the late '70s. Antonio lives in down-

town Havana (Photo B) and has assorted wire antennas on his roof.

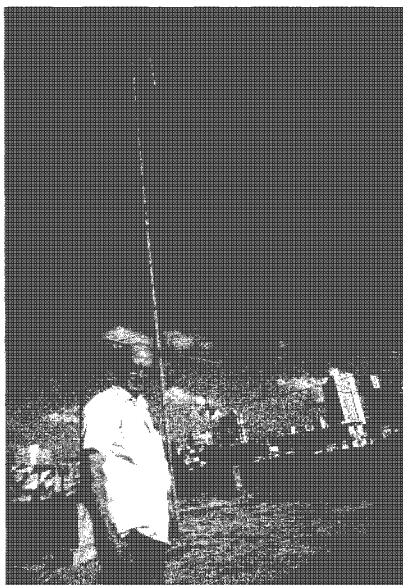
Another ham that I visited in Havana was Winstown CO2WF. He is much younger than Antonio and has a more advanced antenna system (Photo C) on his roof. Also, the equipment is at least a decade younger (Photo D).

Winston's father was a ham, too. Now he lives in the USA, and it's from the USA that Winston gets the hardware.

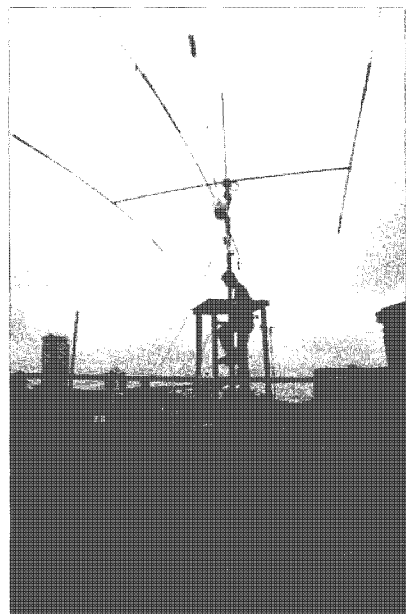
I met both Winston and Antonio at the headquarters of Federacion de Radioaficionados de Cuba. The FRC is the hub of all amateur radio activity on the island. Every Saturday, long-lasting



**Photo A.** Antonio CO2AA in his well-equipped shack. All photographs by Henryk Kotowski SMØJHF.



**Photo B.** Antonio CO2AA on the roof with his antenna in the background, downtown Havana.



**Photo C.** Winston CO2WF on his roof in Old Havana.





**Photo D.** Winston CO2WF at the rig.



**Photo E.** Typical Saturday meeting at the Federacion de Radioaficionados de Cuba in Havana.



**Photo F.** The president of FRC, Pedro CO2RP, at the headquarters.

meetings are held at the headquarters. Some members come here just to meet

friends (**Photo E**), while others look for spare parts for their equipment in the small store run by Conrado CM2CO (**Photo H**). There is a club radio station at the headquarters with the distinctive callsign CO2FRC (**Photo G**). Once a month, license tests are held for new hams at the HQ, and I must confess that the enthusiasm for becoming a ham in Cuba is compelling (**Photo J**). Lunch is served at the club (**Photo I**) and even I was treated to a traditional Cuban meal with black beans and rice. The president of the federation, Pedro CO2RP (**Photo F**) is busy keeping in touch with all local radio clubs in this long country. The organization has over 4,000 members and 75% of them hold a license.

CUBA  
Federacion de Radioaficionados de  
Cuba [FRC]

Location: Paseo #611, entre 25 y 27,  
Plaza de la Revolucion, Havana 10400  
Address: P.O. Box 1, Havana 10100  
Tel: +53 (7) 34811 & 302223  
Fax: +53 (7) 335365  
E-mail: [frcuba@ip.etcscs.cu]  
Web: [http://frc.co.cu]  
President: Pedro Rodriguez CO2RP  
Secretary: Oscar Morales, Jr.  
CO2OJ

IARU liaison: Vice President Francisco Hernandez CO2HA

I was fortunate to be able to visit one such local club. It was in the tourist resort of Varadero, east of Havana. This is where most tourists come and enjoy long, empty beaches. I am not a beach buff, so while footing Varadero I spotted some wire antennas in the residential part of the town. It turned out to be Jose's CM5MA skywires. Jose has a

*Continued on page 24*



**Photo G.** The HQ station of FRC, CO2FRC. Oscar CO2OM (sitting) and Oscar Jr. CO2OJ standing. CO2OM is now SK.



**Photo H.** At the FRC store, Conrado CM2CO sells spares and components.





**Photo I.** Eating after the meeting.



**Photo J.** A line of eager hams-to-be waiting for the license test at FRC.

## Travels with Henryk — Part 9

*continued from page 23*

modern station and quickly announced my presence in town on 2m FM. Soon, Victor CM5VV dropped in (**Photo K**). Victor only had a 2m handheld radio — no HF station at all.

Jose directed me to the local club

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CO5ENA (**Photo L**) lodged in the house of Alberto CO5AM and his wife Belgica CL5NN. Two newly licensed local boys were at the club when I dropped in. They were talking mostly with other Cuban stations on 80 meters. At the age of 18 they could not possibly afford any equipment of their own.

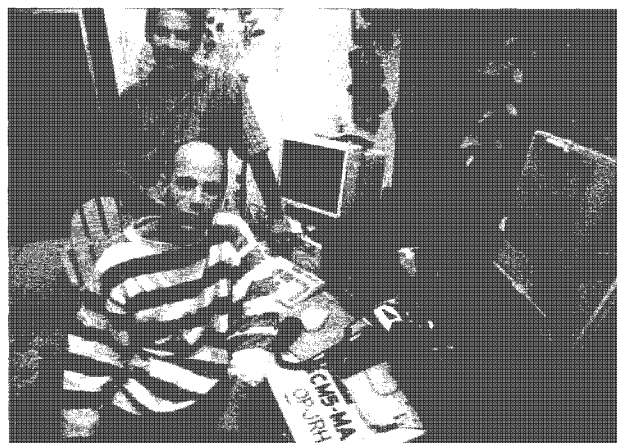
The average income in Cuba is extremely low. However, foreign tourists and small private businesses give more profits. But the major source of cash and commodities are exiled Cubans in the USA supporting their next of kin at home.

Amateur radio is strictly controlled by the State and the economy restrictions make this hobby accessible mainly for privileged people. A successful ham in Cuba must be approved by the authorities, gain the required skills, and afford the gear. Those who meet

these demands are usually devoted to the hobby and are really active. In Dominican Republic buying equipment is not a big deal. The authorities are generous when issuing licenses but ... the activity is not as high as in Cuba.

Striving for something probably creates deeper affection, while things that come easily have lower value. Also, the number of available pastimes in Cuba is limited. Everywhere, hams in rural areas are much more engaged in the hobby than those living in metropolises.

Some friends asked me how I dared to go to Cuba, a country having an austere reputation. Well, I myself lived some 30 years in the post-WWII reality of Poland and I still remember what every foreign visitor to my country meant then to common people like me. 75



**Photo K.** Jose CM5MA and Victor CM5VV behind him at the QTH of Jose.



**Photo L.** Radio club CO5ENA in Varadero, Cuba. Standing Osmani CL5ENC, sitting Alberto CO5AM, his wife Belgica CL5NN, and Yandis CL5ENB.



# I Love My 80m Loop!

*And you will, too!*

*Much has been printed over the years on loop antennas. Experimenting with wire antennas is a favorite pastime for me. I recently had such great results with a delta loop on 10 meters and a rectangular loop on 20 meters (50+ countries in 3 weeks of casual operating!) that I decided to take the plunge and put up an 80 meter full-wave horizontal loop that would allow operation on all HF bands.*

After gleaning all the info in the articles referenced below, and adding my own twist, the antenna would either work or be a "cloud-burner." I am happy to say that this simple antenna far exceeded my expectations! What I found to be so appealing about this antenna was that it was fairly economical and easy to build and install, works on all HF bands, and requires no special feed networks — only a transmatch, coax, and some space!

## 80-meter horizontal square loop

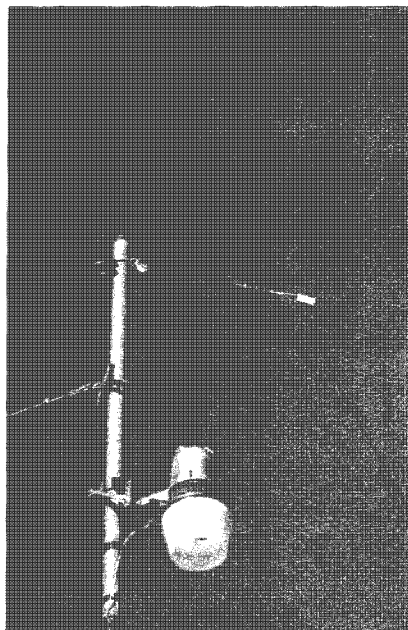
The length of a full-wave 80-meter loop is about 270 feet (1005 divided by frequency in MHz), or about 67 feet per side. I use "about," because exact numbers are not that critical according to my results. In my opinion, when constructing antennas, not only is the old saying "the higher the better" true, but "the longer the wire the better" may also fit some loops. Since I live on 10 acres in the country, I decided to make my horizontal loop longer to start with to better fit my backyard. So, my "longer" loop is about 1.25 wavelengths on 80 meters (2.5 on 40m, 5 on 20m and 10 on 10m) and is installed between 30 and 40 feet in the air.

Scaled-down versions, say 75% of a wavelength, may also work fine if you don't have the room for a full-wave or longer antenna. According to antenna experts, a circular loop is "ideal," but impractical for most hams. I found a square — or even a rectangular loop — is easier on the pocketbook and muscles to put up, and would provide about the same results.

To support my loop made from salvaged telegraph line wire from the Yukon Territory (just think about the stories this wire has already told!), I used my 50-foot-tall tower and three masts, each 35 to 40 feet long, made from 2-inch galvanized water pipe. Each support is "supported" by one 1/4-inch-diameter steel guy wire attached by a U-bolt in the opposite direction of the wire's "pull" and a small pulley with 3/8-inch-diameter rope for hoisting up the wire to the top of masts (Photo A).

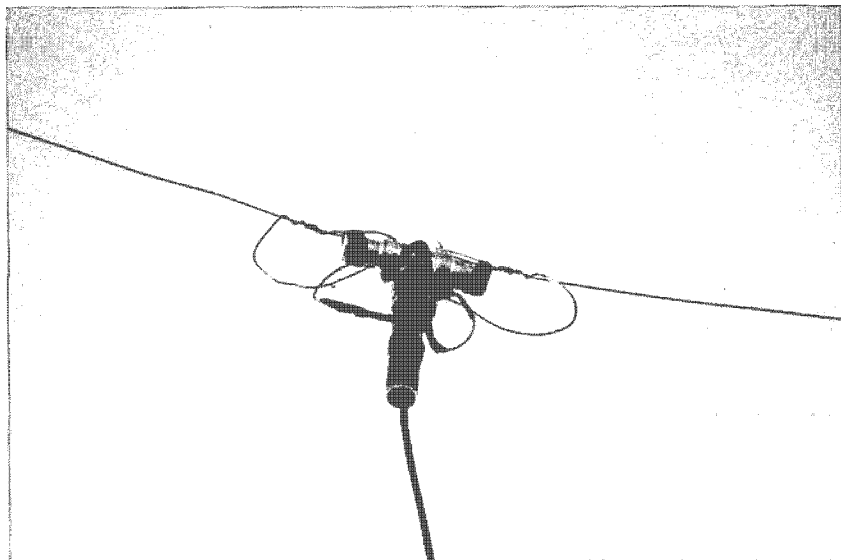
The telegraph wire is #6 AWG copperclad steel and not all that easy to work with, but the price was right. For the feedpoint connection I used a 1-1/2" PVC pipe T terminating the antenna wires to a 1/4" eye bolt as used on some commercially made baluns.

RG-213 coax (chosen for strength and durability, and because I may use an amplifier) terminates on the eyebolt nuts with two flat washers (Photo B). The coax is taped to a ten-inch-long bottom extension of the PVC T to remove strain on the



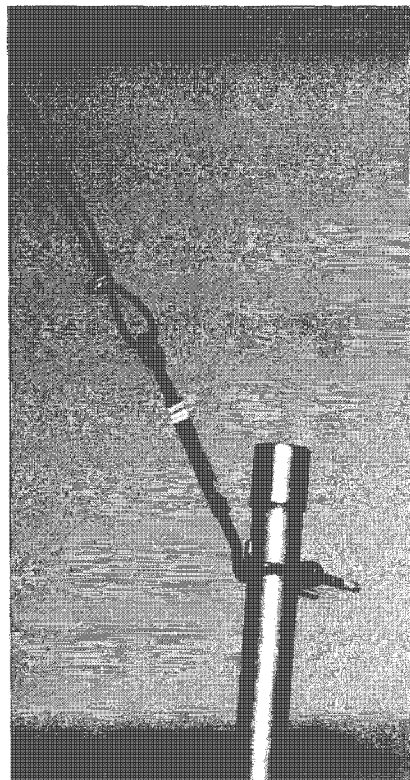
**Photo A.** Pulleys and U-bolts are two of the tools you will need in erecting this antenna.





**Photo B.** All connections in this PVC T assembly have been treated with silicone caulk to ensure that they are weatherproof.

hanging coax. Silicone caulk was then applied to the connections for weatherproofing. For antenna insulators, I used porcelain electric fence insulators. Once the support masts, complete with guy wires (**Photo C**) and pulleys, are installed, raising the wire becomes a one-man operation.



**Photo C.** Guy wire assembly.

On my tower, I installed a six-foot-long 4x4 painted wood post hanging off near the top of the tower for one of the four required supports (**Photo D**). On the post end that is farther away from the tower I used an electric service entrance insulator fastened by U-bolt to "float" (ref. *ARRL Antenna Book*, page 5-17) the antenna wire as with the other three supports. I wasn't sure if all "floaters" would actually allow the wire to float, but they did quite easily.

The wire antenna and feedline connections were made up on the ground and then hoisted up each mast one-by-one with the rope and pulley. Once the wire was in the air and about a foot or two away from the masts, I merely tied off the rope to whatever was handy (e.g., nearby barn roof, tree, etc.). I only had to take up a bit more slack from one pulley (the wire pulls through all the pulleys) for final wire sag adjustments. Since my wire was very heavy-duty, I could pull it tight. Your sag will depend on the type and size of wire used. Smaller-gauge wires will break if pulled too tight or used on long spans — just ask me! My loop is fed about midspan and the coax drops 30 feet straight down into my shack.

#### How does it work?

During the first three months of use

(October through December), 75% of my QSOs on 10 and 20 meters were either 5x7 or 5x9 reports "both ways." About 75% of them were with stations outside North America (about 10% were 5x9 +20!), and about 20% of the total Qs were 5x5 to 5x1 quality "both ways." For those doing the math, call the remaining 5% split equally, 3x3 signals, or simply "no contact at all" (you can't work them all!). Also, my log indicates a "sent" report was the same as "received" most of the time. I even broke several big pileups on the first or second call.

Directivity? Well, the loop seemed to work just fine equally in all directions (I'm still scratching my head!). That's what I really like about this loop!

Gain, you ask? Well, some, depending on your choice of feedline and how high you install your antenna. L.B. Cebik W4RNL goes into a lot of detail on gain (see #4) in his article, so I won't get into that here. Although I have tried this antenna mostly on 10 and 20 meters, I was also pleased with a weekend of experimenting on 15 and 17 meters. DX worked on 15 meters: KL7, HL5, JR1, KHØ, RV9, and BD4. DX worked on 17 meters was KL7 and OH1. Many Ws and VEs were also worked on 15 and 17 meters. Both bands produced about the same results on signals mentioned above over the two-day period of tests. I am confident this antenna will produce good results on 40 and 80 meters as well. I know it tunes 40 and 80 meters quite fast! To give a better perspective on this versatile antenna, on December 29, 2001, I worked my buddy Rick KL7AK back-to-back on 15, 17, 12, and 40 meters! On 15 and 17 meters, we both exchanged 5/9 + 20 reports; on 12 and 40 meters we were up to 5/5 quality. Not bad for a piece of wire, eh?

I did learn however, both 300 watt manual tuners (MFJ and Vecronics) I used took some time to tune the loop, with a couple of bands requiring a lot of patience! I did not try the auto-tuner on my TS-570D since my Tucker 1.5 kW tuner easily handled the job quite fast



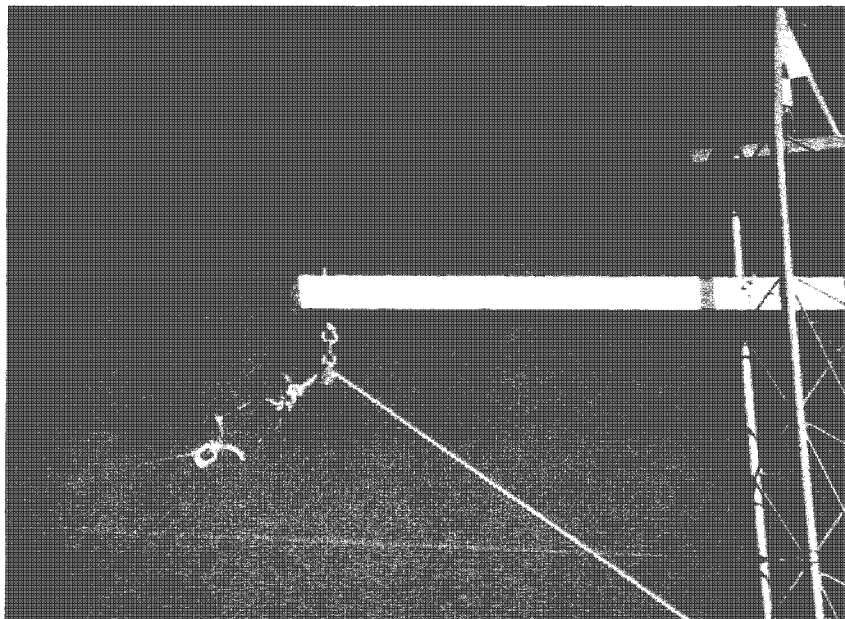


Photo D. One of the four required supports.

on all hands 80–10 meters. My trihandler will remain stored in my garage as I work on a new loop design around 1,200 feet long supported off of 60-foot-tall power poles (but that's another article!) — when I tire of this antenna, that is! I highly recommend this antenna. Good luck with your antenna experimenting! Any and all feedback (\*) is appreciated.

\*I worked all over the USA and Canada, including: KL7, KH6, JY4, V47, KHØ, WP2, WP3, HP1, FO, PA2, 8R1, DS3, G3, LU1, ON7, JA (all), DU1, I2, ES1, UA9, and UA6 to name a few!

#### References

1. "The Loop Skywire," by WØMHS. *QST*, Nov. 1985, page 20, and *ARRL Antenna Book 16th edition*, page 5–16.
2. "The Droopy Loop," by KJ7MZ. *QST*, July 1996, page 57.
3. "Loop Antennas," *ARRL Antenna Book*, 16th edition, page 5–1 (note: #1 is available for download from the ARRL Web site: do "search" for "constructing loop antennas").
4. "HO-HO-HOPLs," by W4RNL [[www.cebik.com/at11.html](http://www.cebik.com/at11.html)].

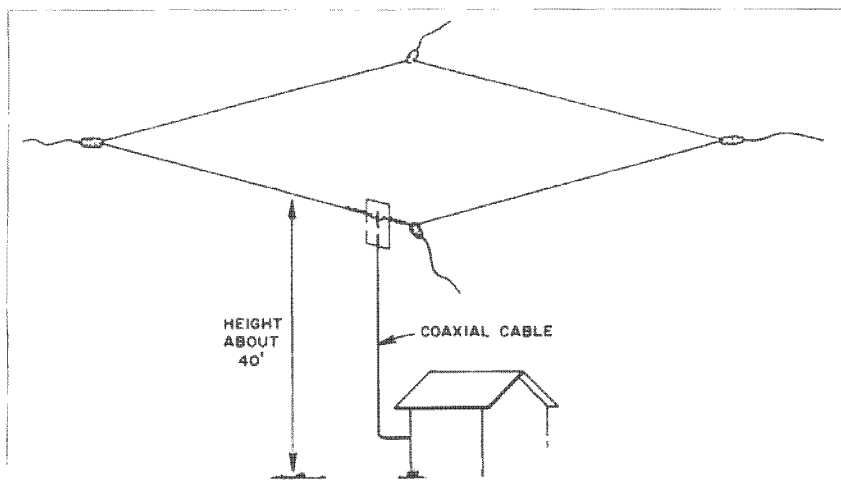


Fig. 1.

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# No Place Like Ohm

*A little refresher on the basis for most of what we do.*

*Has Congress sneaked through a new law to tax our brains? No. Ohm's law has been on the books for a long time. It hasn't been published in the Federal Register, but is found in some physics texts. Yet, it is an essential law of electricity.*

**G**eorge S. Ohm, a German physicist, formulated the relationship between current and voltage in 1827. He found that the current in an electrical circuit varies directly with the EMF (electromotive force). He introduced a proportionality constant  $R$  relating current to voltage. The expression for the current was  $I = E/R$ . The quantity  $R$  is called resistance and is usually written as the Greek letter  $\Omega$ . The EMF is given as  $E$ , and the current, by  $I$ .

We know resistors as Bakelite cylinders with wires coming out the ends that my wife says look like little

firecrackers. The resistance of wires or tracks on PC boards is considered as zero. When the wire resistance is low compared to the other resistance in the circuits, it can be ignored without serious consequences, but when the other resistance is very low, the wire resistance can't be ignored.

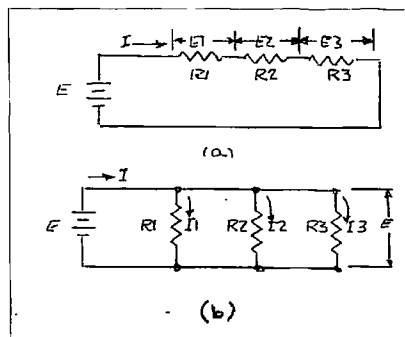
To illustrate the point that the resistance may be small but not zero: I was checking that the fuses in a piece of equipment would blow when the filament transformer's secondary was shorted. The filament transformer was rated at 100 A, and I attempted to blow the fuse by putting a two-foot AWG #18 short on the secondary. The short wasn't short enough. The resistance of the wire wasn't low enough. The insulation on the wire charred but the fuse didn't blow. It took the blade of a screwdriver across the terminals to do the job. A short is relative.

Every conductor has resistance. We may assume that the resistance of a wire is zero, but what we're really saying is that the resistance is low compared to the other resistance in the circuit and can be neglected. The "other" resistances include the internal resistance of the source.

In a series circuit, the same current flows in all parts of it. **Fig. 1** shows a series circuit in which the voltage drops across each of three resistors is  $E_1$ ,  $E_2$ , and  $E_3$ , and  $E = E_1 + E_2 + E_3$ . Since the same  $I$  flows in each resistance, Ohm's law states that the total resistance is  $R = E/I = (E_1 + E_2 + E_3)/I = E_1/I + E_2/I + E_3/I$ , and using Ohm's law,  $E_1 = R_1 I$ , etc. The total resistance is  $R_1 + R_2 + R_3$ . This shows that the equivalent resistance of resistors connected in series is equal to the sum of the individual resistances.

In **Fig. 1(b)**, three resistors are shown connected in parallel. The currents in the resistors are  $I_1$ ,  $I_2$ , and  $I_3$  and the voltages across each resistor is  $E$ . Using Ohm's law,  $R = E/(I_1 + I_2 + I_3)$ . Inverting both sides of the equation,  $1/R = (I_1 + I_2 + I_3)/E = I_1/E + I_2/E + I_3/E = 1/R_1 + 1/R_2 + 1/R_3$ . The reciprocal of the total resistance is the sum of the reciprocals of the individual resistances.

The reciprocal of resistance is conductance, and  $G$  is equal to  $G = 1/R = R^{-1}$ . In a parallel circuit, the total conductance is equal to the sum of the individual conductances,  $G = G_1 + G_2 + G_3$ .



**Fig. 1** (a) Resistors in series add. (b) Resistors in parallel have an equivalence that is smaller than the smallest resistor.



Before handheld calculators became common, calculating the conductance was a bit of a bother, and the equivalent value of two resistors in parallel was rewritten as  $R = R_1 R_2 / (R_1 + R_2)$ . With the handheld calculator the reciprocal is easy to compute and the total resistance is  $R^{-1} = R_1^{-1} + R_2^{-1}$ .

The resistors, those little firecrackers, have stripes of paint at one end that indicate the value of the resistance in ohms. The first band indicates the most significant number; the second, the next significant number; the third, the number of zeros, and the fourth band nearest the end, the tolerance. The color code used to mark resistors is common through out the industry. The color code for resistors is used for capacitors and transformers and anything else identified by numbers. The color code should be committed to memory if you have to pick different values out of the pile very often: 0 = black; 1 = brown; 2 = red; 3 = orange; 4 = yellow; 5 = green; 6 = blue; 7 = violet; 8 = gray; 9 = white; 10% tolerance = silver; 5% = gold.

A sexist saying to help remember the code is: Bad boys ruin our young girls, but Violet gave willingly. There are other politically correct sayings, but I can't remember them.

The standard values of resistors depend on their tolerance and the manufacturing process. For example, composition resistors are available with 5% and 10% tolerances. The significant numbers are as follows: 1.0\*, 1.1, 1.2\*, 1.3, 1.5\*, 1.6, 1.8\*, 2.0, 2.2\*, 2.4, 2.7\*, 3.0, 3.3\*, 3.6, 3.9\*, 4.3, 4.7\*, 5.1, 5.6\*, 6.2, 6.8\*, 7.5, 8.2\*, 9.1. The asterisk indicates values found only with 10% tolerance.

Thus, a 56k  $\pm 5\%$  resistor is marked green, blue, orange, gold. A 1k  $\pm 10\%$  resistor is marked brown, black, red, silver.

The flow of current through a wire or any other conductor always produces heat or dissipates power. The power dissipated depends on the current — the greater the current the higher the dissipation. Experiments show that doubling the current quadruples the power dissipated and that the heat produced is proportional to

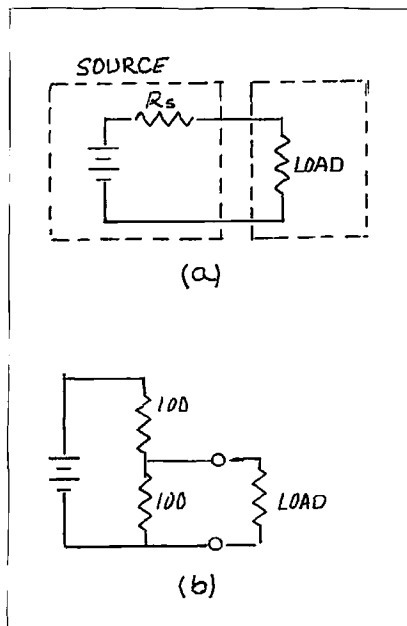
the square of the current. Still another factor is involved, namely the resistance of the conductor. Summing up, the power dissipated is proportional to the resistance of the conductor and the square of the current,  $P = I^2 R$ .

The physical size of a resistor depends on the power handling capabilities. In general, larger sizes can dissipate more power or operate at a higher temperature. Different manufacturing techniques have different power/size relationships. For example, a wirewound resistor can dissipate more power for a given size than a composition resistor because it can operate at higher temperatures.

Since from Ohm's law,  $I = E/R$ , power can be expressed as  $P = I \times I \times R = I \times E/R \times R = IE$ . When the power and resistance are known,  $E$  causing the current flow can be calculated,  $E = \sqrt{PR}$ . When power and  $R$  are known, the current can be calculated  $I = \sqrt{(P/R)}$ .

Accordingly, the current in a 100 W 120 volt lamp is  $I = P/E = 100/120 = 0.833$  A when 120 volts is applied. As an aside, the resistance of an incandescent lamp is not constant; it changes as the filament becomes incandescent and glows. As a general rule of thumb, the cold resistance is a tenth the resistance of the rated operating resistance. For example, the rated operating resistance of a 100 watt 120 volt lamp is  $R = \sqrt{(E^2/P)}$ ,  $R = \sqrt{(120^2/100)} = 12\Omega$ . The cold resistance is only 1.2 $\Omega$  when the lamp is first turned on, and increases when the lamp is bright.

In many cases, a source's internal resistance is assumed or ignored. But, depending on the source, it should be determined. The measurement for data to calculate the internal resistance of a source is simple. **Fig. 2(a)** shows a simple series DC circuit whose source resistance  $R_s$  is to be determined. The data needed to calculate the internal resistance is simple to find: Measure the open circuit output voltage, then load the source with a known resistance. And measure the loaded voltage. Calculate the current in the load with Ohm's law. Then, with the change in voltage and the calculated load current, the source's resistance can be cal-

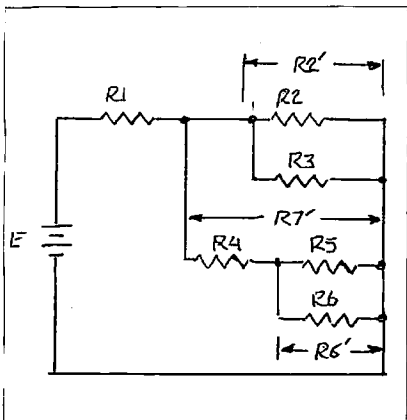


**Fig. 2 (a)** A battery has internal resistance. **(b)** A voltage divider source has an internal resistance.

culated. For example, if the open circuit voltage from a battery drops from 9 volts to 8.8 volts when a 2.2k load is applied, the load current increases from zero to  $8.8/2.2 \times 10^3 = 4 \times 10^{-3}$ . The change in voltage is the drop across the internal resistance. The internal resistance of the source can then be calculated:  $0.2V/4 \times 10^{-3} = 50\Omega$ .

The circuit of **Fig. 2(b)** shows a different kind of source, but the internal resistance can be found in exactly the same way. If the open circuit voltage

*Continued on page 54*



**Fig. 3.** Complex networks can be simplified.



# Solid State Junk Box Thermometers

*Everybody needs one of these.*

*Do you, also, have a "catch-it" box that contains components you have collected over eons of time, and you wonder when you will ever find a use for some of them?*

On observing some of my 50 years' worth or so of what I call "good stuff," and what my dearest refers to as junk, I noticed a few microammeters that I had saved because every ham needs a few of those — does he not?

As one of the meters was 0–100 microammeters, I was reminded of the freezing and boiling points Celsius, so why not build a solid state thermometer? I recall it being said that a silicon diode has a linear voltage drop per degree Celsius over a fairly large

range. If you enjoy building your own circuits at times, you can easily build and enjoy this unit. All parts came from my spare parts locker.

The sensor diodes are attached to a pair of three-way posts, thereby allowing leads to be connected and the sensor to be placed remotely as needed. Use it to measure the temperature rise of a suspicious power transistor, transformer, or other component, as well as measuring the frequency drift of oscillator circuits. You can mount the sensor outside your shack and be prepared to answer that DXer with the temperature outside. Most of them use Celsius I have noticed. You may even use it to measure the temperature of liquids. By nulling out the null meter, you can see immediately the change that has taken place over a period of time in reference to a prior reading, without having to write the figures down and doing the math.

Figure 1

The central parts of the unit are the silicon diodes D1 and D2, used as a sensor. I used the 1N649 diodes as that was what I had on hand. While I am sure that others may suffice, I will

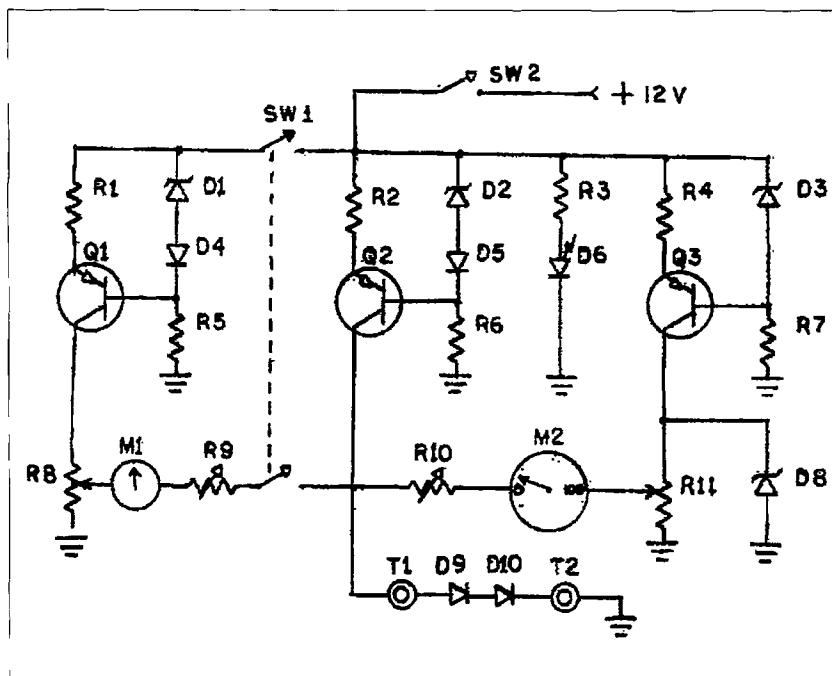
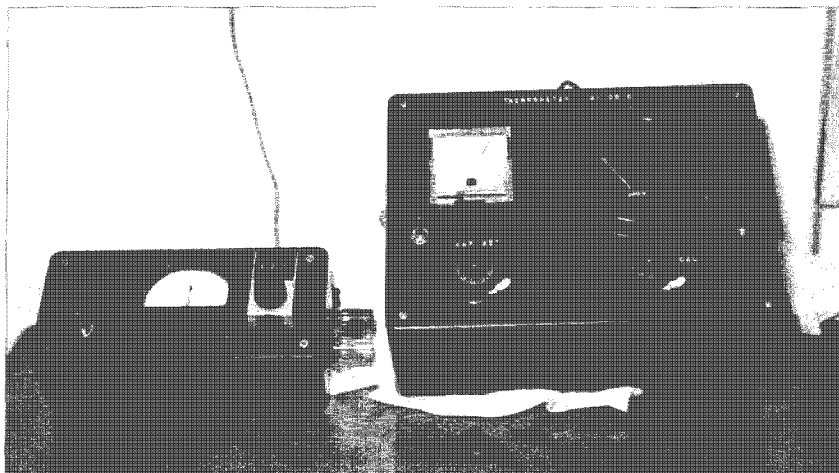


Fig. 1. 0–100°C thermometer with variance set.





*Photo A. Both styles of thermometers.*

share one bit of experience gained from my days in an environmental laboratory. We found that the double-studded (no S-connector internally) diodes would sometimes show an open circuit when they had been cycled from a cold to an ambient temperature.

My old D.A.T.A. book does not show the temperature coefficient for switching diodes or rectifiers, but I seem to recall that the silicon diode had a negative  $T_c$  of 2 mV to 2.5 mV per degree Celsius. Then there is the choice of what steady current to use to arrive at the figure of 2 mV per degree C. My ham shack is "outback" and has to be heated with a small wood stove. I tested the diodes by connecting a current supply and, since it was winter, pulling on my long Johns, going out to the shack when it was near zero degrees, and measuring the voltage drop across the diodes at different current

levels. I would start the wood stove, and at every five degrees increase in temperature, I would record the voltage drops at the different current levels.

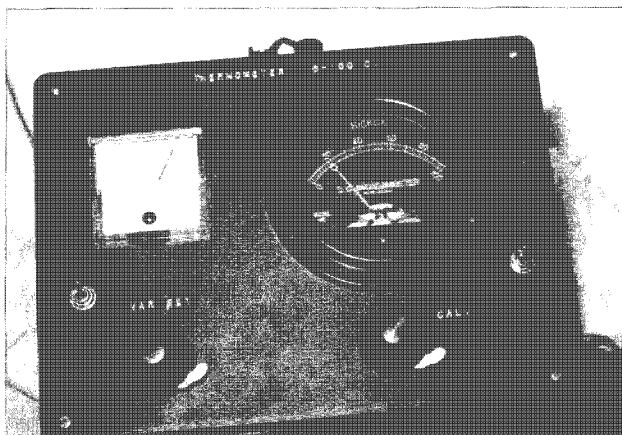
Using two diodes in series for the sensor, we will have a negative voltage drop of 4 mV per degree C of temperature rise. For 100 degrees that will be a -400 mV change. So, for the 100  $\mu$ A meter, the total meter resistance needs to be 4k ohms. The meter's internal resistance is 1.3k ohms, so trimpot R10, 5k ohms, is installed and adjusted to 2.7k ohms.

The sensor diodes are constant-current fed by Q2, D2, D5, R2, and R6. Diode D5 is to partially offset the positive  $T_c$  of zener D2. Zener D8, 1N825, sets the 6.2 volts for R11. This will provide R11 with a current near 12.6 mA. A constant current circuit of Q3, D3, R4, and R7 will provide approximately 20 mA, giving D8 a steady

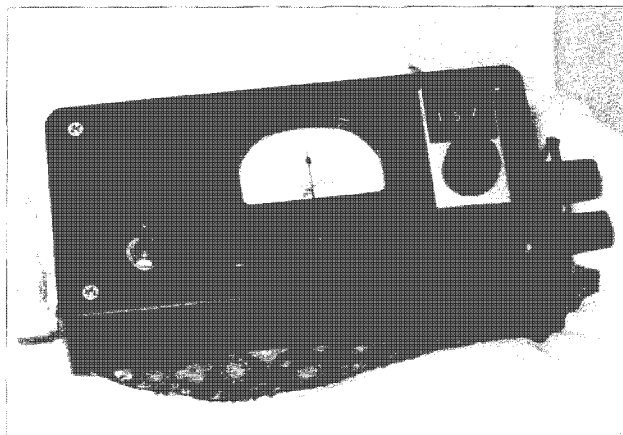
current of 7 to 8 mA. D3 must be a low enough value to allow for 12-volt power supply operation.

Initial adjustment may be made by setting the total meter circuit resistance to 4k ohms. Then adjust R11 so the room ambient temperature is indicated on the meter. A further test, if desired, may be done by setting the sensor in a bath of ice water and adjusting R11 for zero degrees on the meter. The sensor diodes are connected in line and black shrink tubing covers the diodes and leads, leaving only enough leads showing to allow for remote leads to attach. Care should be exercised in putting the sensor in liquid so that only the part covered by tubing is immersed; otherwise, the signal could be shorted. Having set R11 for zero degrees, you may then desire to put the sensor in boiling water and notice that the meter should read close to 100 degrees. It will probably be a bit short as when full-scale current, 100  $\mu$ A, goes through the meter circuit it also causes a few millivolts drop across a portion of R11. This is when R10 needs tweaking so that exactly 100 degrees is indicated on the meter.

The center scale meter, M1, circuit was added to provide a visual method of observing, at a glance, a temperature deviation between an earlier setting and a later reading rather than having to write the figures down and subtract. Meter M1 is a center scale meter with 25-0-25  $\mu$ A end scale full-scale readings. However, the end scale numbers on the dial are 30-0-30. What we desire is to have the dial numbers to equate to



*Photo B. 0-100°C thermometer with variance set.*



*Photo C. 0-100°C thermometer with digital readout.*



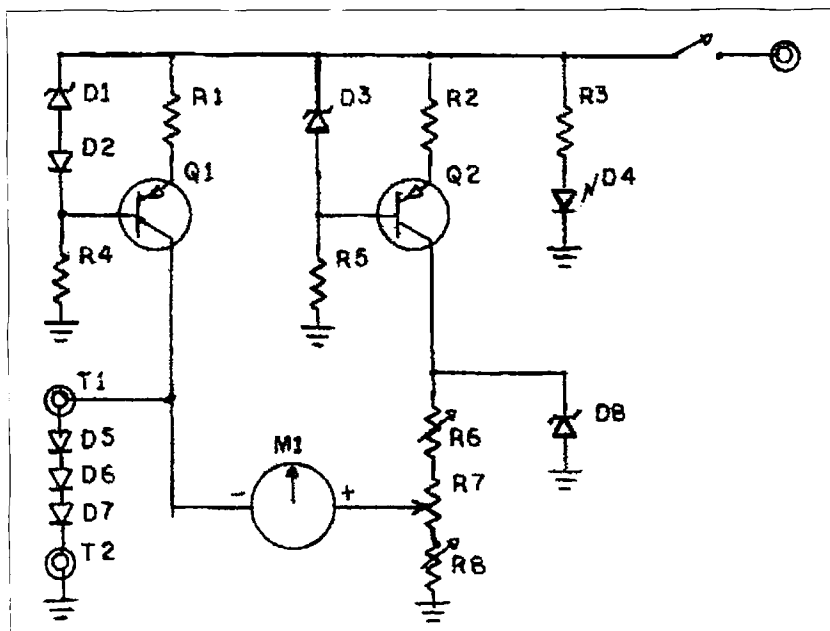


Fig. 2. Digital 0-100°C thermometer.

degrees C without having to extrapolate. This requires for full-scale deflection reading of 30 degrees C (25  $\mu$ A), a total meter circuit resistance of 4.8k ohms. The internal resistance of the

meter is 1.3k ohms so we need a 3.5k ohms in series, which is supplied by trimpot R9.

The center scale meter circuit has a switch so it may be turned off when

not wanted, as when you might care to measure a temperature variance of more than 35 degrees C when you are not closely monitoring.

Due to the constant-current circuits, the supply voltage may well be any from plus twelve volts to a plus twenty-four volts with no appreciable difference.

Figure 2 (Photo C)

If you do not have a 0-100  $\mu$ A meter, you can make a smaller, still handsome, unit if you have a center scale microamp meter and a ten-turn precision pot with a digital readout dial ... or the analog ten-turn dial.

This circuit is similar to the Fig. 1 circuit, but with only a center scale meter required, a microamp meter should be used — but any sensitive meter will suffice as the meter is only used for nulling purposes. The meter I had handy was a 50-0-50  $\mu$ A unit.

The sensor diodes have been increased to three to provide a bit more sensitivity of the meter adjustment. When installing the ten-turn dial to R7, be sure to turn both to their full counterclockwise position; then tighten the dial screws. When the pot is full counterclockwise, the dial should read zero. Clockwise rotation of the dial should move the movable contact towards R8.

If you have an ambient temperature near zero degrees C, disconnect, temporarily, the connection between M1 and R7. Now write down the ambient temp and the voltage of the sensor. If the temp is a few degrees above zero degrees C, extrapolate what the voltage would be at a positive 6 mV per degree variance down to zero degrees C. In my case, my zero sensor voltage figured out to be 2.125 volts. R7 must span 100 degrees C, which would be a total sensor voltage change of 600 mV. R7 being 500 ohms, that means we desire to set the current through it at 1.2 mA. When the dial reads 1,000, the sensor voltage should be 1.525 volts, which means trimpot R8 should be adjusted to 1.271k ohms.

Parts for Fig. 1 (Photo B)		Parts for Fig. 2 (Photo C)	
Name	Description	Name	Description
D1, D2	6.2 V zener, 1 W	D1	6.2 V zener, 1 watt
D3	4.1 V zener, 1 W	D2	1N914
D4, D5	1N914	D3	4.1 V zener, 1 W
D6	LED	D4	Red LED
D8	1N825	D5, D6, D7	1N649 sensor
D9, D10	1N649 sensor	D8	1N825
M1	Meter, 25-0-25 $\mu$ A, end scale, 1.3k, 30-0-30 end scale reading	M1	Meter, 50-0-50 $\mu$ A, center scale, 860 $\Omega$
M2	Meter, 100 $\mu$ A, 1.3k	R1	2.7k, 1/4 W, 5%
Q1, Q2, Q3	2N2905	R2	390 $\Omega$ , 1/4 W, 5%
R1	560 $\Omega$ , 1/4 W, 5%	R4	560 $\Omega$ , 1/4 W, 5%
R2	1.5k, 1/4 W, 5%	R5	5.1k, 1/4 W, 5%
R3	1.2k, 1/4 W, 5%	R6	5k trimpot
R4	160 $\Omega$ , 1/4 W, 5%	R7	500 $\Omega$ 10T wirewound, 3/4 in. w/ dig. readout counter
R5, R6, R7	5.1k, 1/4 W, 5%	R8	2k trimpot
R8, R11	500 $\Omega$ 10T 3/4 in.	T1	3-way terminal, red
R9, R10	5k trimpot	T2	3-way terminal, black
SW1, SW2	DPST mini toggle	—	—
T1	3-way terminal post, red	—	—
T2	3-way terminal post, black	—	—

Table 1. Parts list for 0-100°C thermometer with variance set.



# Going Over a Gonset G-77

*A transmitter from the old days (well, 1957) gets tested and evaluated.*

*Gonset equipment for ham radio applications has always been very dependable and easy to use. It's rare to find a fault with any of the Gonset designs that were produced as each was tailored to meet a ham application. Although I own several pieces of Gonset equipment, I'd not worked with a G-77 transmitter until my friend Johnny WB6HYR asked me to test and evaluate his unit.*

Only after obtaining a copy of the operator's manual did we discover that the companion modulator-power supply was missing. At first it was thought that the transmitter package contained all that was required for a complete unit. But since it didn't, the transmitter evaluation continued as planned by applying power from my bench supply.

The G-77 transmitter, shown in **Photo A**, was designed and delivered to the ham community during the 1957 era when amplitude modulation (and CW) was still the mainstay for ham communications even though SSB was

on the rise. The G-77 was designed exclusively for mobile operation and covered five ham bands from 3.5 to 29.7 MHz at a power input of 50-60W using a 6146 tube in the final amplifier. With a pi-tuned output, the transmitter would accommodate most any mobile antenna/feedline impedance requirement with 50 ohms being the nominal value.

At the time of design, automotive electrical systems were still in the transition from 6 volts to 12 volts. Although most new cars at that time were 12 volts, a lot of 6 volt system vehicles were still in existence. As delivered,

the G-77 transmitter and power supply had internal jumpers set for a 12V system, but could be changed to accommodate a 6V system.

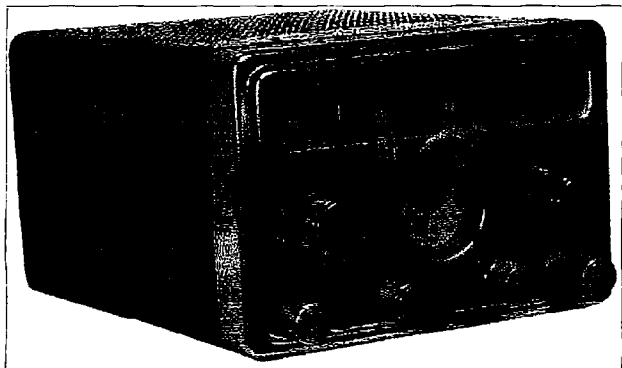
**Photo B** shows the internal physical placement of the oscillator and multiplier tubes. A 6CL6 tube is operated as either

a VFO or as a crystal-controlled oscillator. A 6CM6 is used as a buffer/multiplier following the oscillator. For the 80m band, the frequency of operation is between 3.5 and 4.0 MHz, and for the remaining bands, the oscillator operates in the region of 7 MHz with the 6CM6 multiplying the frequency up to the selected band. During my evaluation, I found the VFO to be very stable. However, I did note some microphonic tendency when the chassis received sharp blows that were in excess of typical vehicle vibration. Therefore, I assume the crystal-controlled option was available for a fixed frequency net operation and not strictly for reducing microphonics.

## Bench power

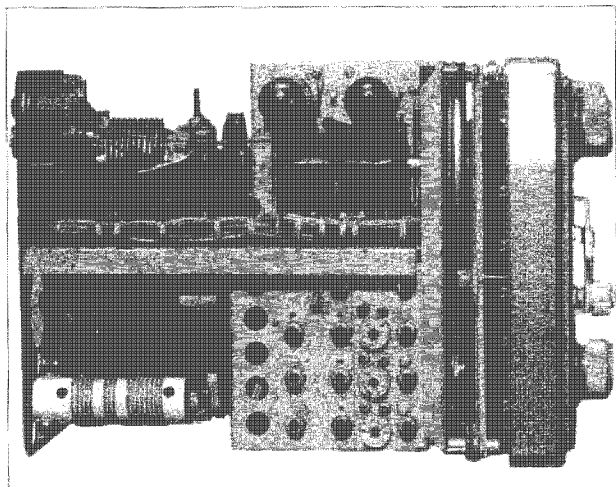
To perform an evaluation of the transmitter, I applied power from my bench supply that provided 12VAC for the heaters and 0-250VDC for the B+ circuits. However, the PTT relay required 12VDC if it was to be operated — more on that in a moment.

When in normal mobile operation, the transmitter and power supply were idle during receive in order to conserve battery power. But the issue

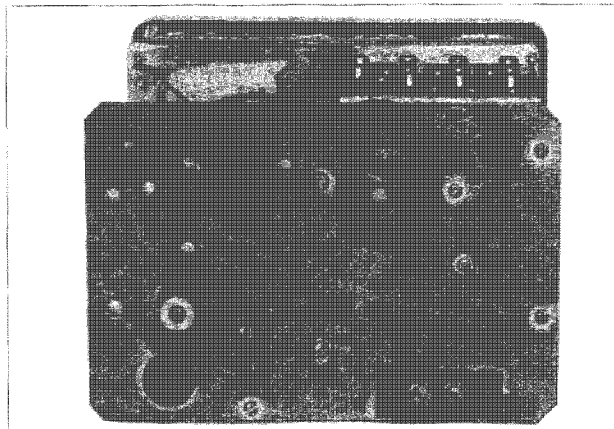


**Photo A.** This is a front panel view of the Gonset G-77 low band mobile transmitter.





**Photo B.** This photo shows the placement of the oscillator, frequency multiplier and PA tubes.



**Photo C.** This is a rear panel view of the transmitter showing the various connectors. Take note of the Jones power connector, antenna connectors, and the terminals for optional low band loading capacitance.

during bench testing was how the PTT was configured to accommodate a rapid turn-off of the transmitter during the transition from transmit to receive. By design, one set of contacts of the PTT relay short the B+ line, through a resistor, to ground with the intention of quickly killing the oscillator during the transition.

Therefore, to apply bench power to the transmitter, I had to either apply 12VDC to the PTT relay to switch it, or to mechanically move the relay contacts into the transmit position. I chose the latter approach and slipped a piece of folded paper between the upper contacts forcing the relay armature downward. The benefit was two fold: The short was removed from the B+ line, and the antenna coax connector was connected to the pi-tuned output circuit — the transmitter was now in a “transmit” mode.

To test the transmitter, I decided to apply power in two steps with the first involving only the oscillator and multiplier circuits. The second step would activate the power amplifier once the oscillator and multiplier circuits were found to be functional.

**Photo C** shows the Jones connector that is mounted on the back of the transmitter where all power is applied. In the absence of a mating connector, I chose to use short lengths of #20 bare copper wire to lend access to the socket pins. To start, a wire was slipped into pins 10 and 11 to pick up

the B+ lines for the oscillator and multiplier — I applied 175-200V.

Later, when the power amplifier was activated, the wire lead ends of a 15k 2W resistor were slipped into connector pins 5 and 8. A high voltage of 175-225V was then applied to B+ pins 5, 10, and 11 (the 15k resistor applied power to pin 8). The purpose of the 15k resistor was to drop the screen voltage to a value well below the voltage on the plate of the 6146 PA tube.

### Alignment/tracking

During my checkout of the transmitter, I found only two problems that required attention. The first was a lack of lubrication in the gears and shaft bearings. Lubrication of the gears and shaft bearing was done using a light weight machine oil. Because of the age of the equipment, the switch wafer contacts were sprayed with TV tuner cleaner to remove the oxides. The second problem was the alignment error between the actual frequency generated and the indicated dial marking.

The error involved the band of generated frequencies that exceeded the indicated dial range — this was a tracking error, not just an alignment offset error. Tracking alignment involves measuring the generated output frequency with a frequency counter or with a calibrated receiver and comparing the frequency to the dial marking as the dial is rotated from one end to

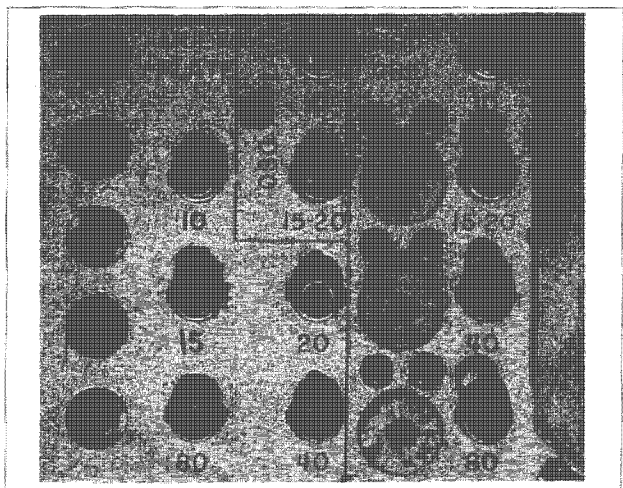
the other. If the generated frequency band is wider or narrower than the dial's band marking, then a tracking error exists.

An alignment error would be as simple as an offset in frequency generated from the dial's indicated frequency. The 10m ceramic trimmer capacitor, as discussed shortly, is used to make minor frequency VS dial alignment adjustments. NOTE: This capacitor's adjustment affects all bands, not just the 10m band.

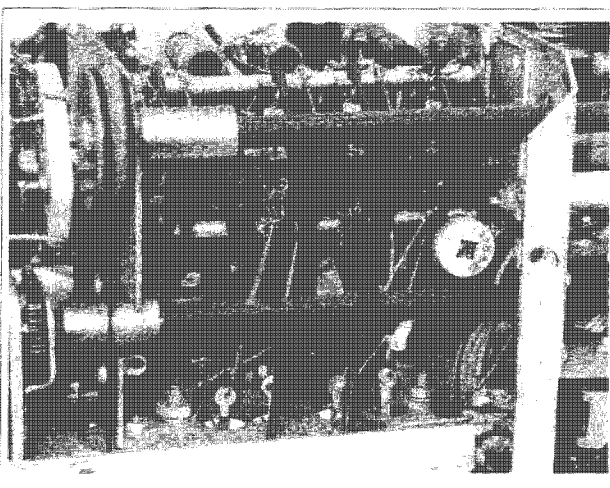
Tracking is controlled by the values of inductance (L) and capacitance (C) that exist in the tuning circuit. The width of the tuned band is controlled by the ratio of L to C values. As an example, if the band of frequencies generated is wider than the dial markings, then the value of C must be increased and the value of L must be decreased in order to narrow the generated band of frequencies. Because of the interaction between the L and C adjustments, the generated frequency and dial's band edge markings must be compared after every adjustment until the frequency and the marking match.

NOTE: I had a problem measuring the oscillator and multiplier output frequency when using a frequency counter during the oscillator/multiplier tests. Only after the PA was energized did the counter begin to reliably indicate the correct frequency. Even though the counter's detected signal





**Photo D.** Tracking and alignment is performed by adjusting only the L and C values shown in the "OSC GRID" section. All remaining adjustments are left untouched.



**Photo E.** During tracking alignment, the ceramic trimmer capacitor shown mounted on the band switch wafer is the C value that is adjusted for the 10m band.

level appeared to be sufficient while probing the multiplier plate coils, the counter failed to provide a stable frequency indication. After trying several antenna and loop pickup techniques, I finally gave up on the counter until the PA was energized. To make valid and reliable frequency measurements during the tracking adjustments, I used a digitally synthesized receiver that tuned 80m through 10m.

Before performing a tracking adjustment, it was necessary to identify where each L and C component was located for each band. **Photo D** shows the marked metal panel that holds the majority of the band L and C components. To perform tracking adjustments, only the "OSC GRID" L and C values were touched. I found no need to touch the remaining adjustments on the panel. Alignment was performed first with the 10m band and working down to the 80m band as the last one. The reason for starting with the 10m band is that the C component for the 10m band is fixed across the main tuning capacitor and the adjustment will affect all other bands. Physically, the 10m C component is located on the underside of the chassis and is soldered to a band switch wafer as shown in **Photo E**.

In general, the technique required to perform a tracking alignment is as follows:

1) Adjust the dial to the highest indicated frequency and take note of the

generated frequency. It's important to place the dial pointer to the same mark as accurately as possible with each subsequent setting.

2) Adjust C to shift the measured frequency to that of the dial marking.

3) Rotate the dial to the lowest dial frequency and take note of the generated frequency. Using a plastic hex tuning tool, adjust the L value to shift the measured frequency to that of the dial marking.

4) Because of the L and C interaction, switching back and forth between dial band edges is required until the generated frequency matches the dial marking.

Unfortunately, there may be some disparity between the mid-dial marking and the generated frequency even though the dial ends track. In such a case, some compromise may be desired to average the "dial" error at selected dial points. Minor adjustment of the L and C values will provide the compromise. Repeated checking between the mid and end frequencies must be done until the desired compromise has been achieved.

#### Powering the PA

Before applying power to the PA circuit, the 50-ohm dummy load was attached to the antenna coax connector. I had an in-line power meter ahead of the dummy load as a power output

monitor. In addition, I had a field strength meter near the transmitter so that I could observe any RF output from the transmitter because the FS meter is more sensitive to an RF level than the power meter. B+ to the transmitter was raised slowly in order to make sure there were no power shorts in the PA circuit and to make sure the tuning adjustments were close to resonance as the voltage was increased.

At one point, the folded paper that I'd wedged into the PTT relay contacts apparently relaxed, disconnecting the load from the pi-network. The transmitter worked fine after fixing that minor issue. All of the normal operator controls were functional. With about 200V on the B+ line (Jones connector pins 5, 10, and 11) and with the PA operating, the frequency counter was now indicating a valid output frequency.

To keep tube dissipation to a minimum during tune-up, adjustments to the PA were done quickly to achieve resonance. Fortunately, the G-77 tunes easily with a fairly broad response making adjustment quite easy. Once resonance is achieved with the plate tuning capacitor, the output loading capacitor may be adjusted incrementally, along with the plate tuning, to transfer the greatest amount of power to the load. With only 175V on the plate of the PA, I hadn't expected to see much output power and was surprised to see between 8-9W showing



on the power meter. If you assume a 60% efficiency, the input power was probably in the 20W range. I suspect that with 500V applied to the PA plate, the transmitter is capable of 60W input power.

### Modulator-power supply

The companion modulator-power supply for the G-77 was designed for use with either a 6V or 12V automobile system. Because the drawing as obtained was of poor quality, I took the liberty of drawing in some missing lines, etc., to make the image more useful.

Fig. 1 shows a schematic of the modulator-power supply that is of better quality after some repair work

was done to enhance it. (Unfortunately, the schematic for the whole rig is not so salvageable, and barely readable.) The design uses a synchronous vibrator to chop the DC input power to create AC required by the power transformer. The transformer's output drives a halfwave voltage doubler creating both +250V and +500V for the transmitter. An 0A2 VR tube obtains power from the +250V source to provide a stable +150V for the oscillator.

One of the unique features of the Gonset mobile supply design is the use of relay RL2, whose purpose is twofold: 1) to hold off applying HV to the PA until the 500V value has reached nearly the maximum value, and 2) to

reduce the surge current through the rectifiers during the charge time required by filter capacitor C303. To achieve the required time delay, resistor R216 was selected to limit the relay coil current until the applied power supply voltage approaches an operating level.

The modulator portion of the system is pretty much a straightforward high power audio amplifier capable of producing AF power approaching 35W. Circuit values have been selected to provide an audio pass band within the range of 300-3000 Hz. Sufficient feedback is provided to reduce the tendency for audio distortion and excessive peak modulation.

*Continued on page 54*

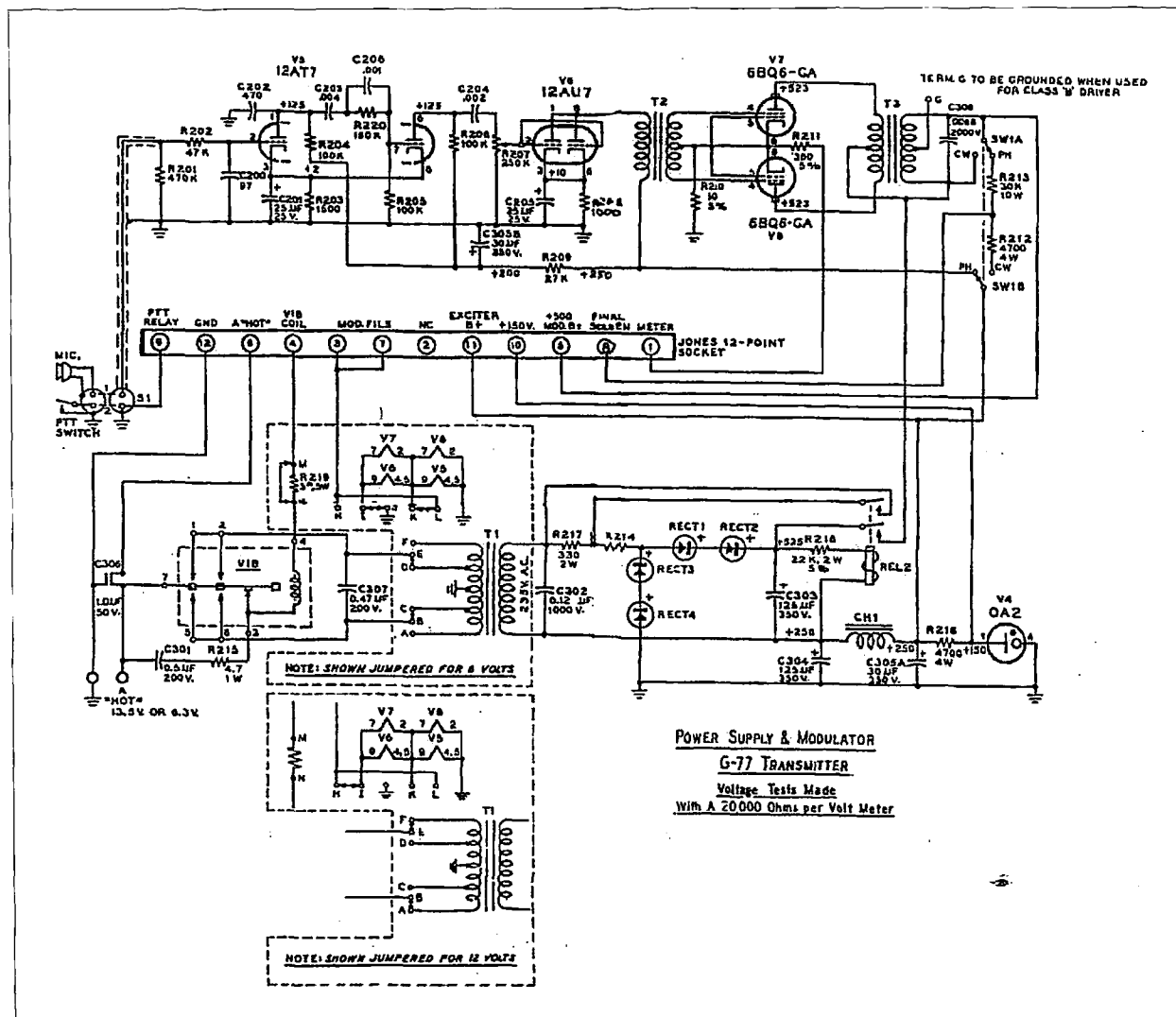


Fig. 1. Modulator-power supply schematic.



# Read All About It!

*Part 12 of good stuff from The Hertzian Herald.*

## *Ten More Tech Tips, Capacitor Capers, and The Old Man.*

**H**ere, without further ceremony, is another batch of tech tips that I hope you will find useful.

1. Wrap a few inches of solder around the cord of your soldering pencil or gun. You'll be glad you did when you find you've left your solder roll in the basement and you're on the roof!

2. A piece of brown paper grocery bag is usually just abrasive enough to remove the dirt from your key contacts without damaging the metal surface. Files and emery papers can do permanent damage to the contacts.

3. Never leave a VOM on the OHMs ranges. This can cause a continuous drain on the battery, possibly resulting in leakage of battery acid and destruction of the VOM's circuit board.

4. Sometimes a volume control or other potentiometer goes intermittent because the wiper isn't making good contact on the carbon track. Try pulling on the knob as you rotate it. If this helps, you may be able to keep a permanent "pull" on the shaft by

wrapping and twisting a no. 24 bare wire around the shaft between the mounting threads and the shaft C-clip.

5. A good cutting pliers should snip a piece of paper as cleanly as a scissors, or nip a hair off the back of your hand without you feeling a pull. Hold it up to the light: The jaws should mesh so well that you can't see light between them.

6. The tip of a long-nose pliers should mesh first, then as more pressure is applied the jaws should mesh further back. Try picking up a scrap of paper with the tip using a light grip. Then try holding a narrow strip about 1/2 inch back from the tip with a firm grip.

7. One of the most useful tools in your kit (and the hardest to find) will be a small steel-wire brush, with bristles about 3/4-inch long in a bundle about 1/8-inch in diameter. You see, the most common cause of difficulty in soldering is a tough oxide coating which forms on the surface of some metals. Rosin flux can't dissolve the more stubborn coatings to let the solder through, but a good scrubbing will take it off. If the surface is smooth you can scrape the oxide off with a knife.

8. The second most common cause of soldering difficulty is not getting the work hot enough to get the solder to bond to it. Heat the work with the pencil, but melt the solder with the work, not with the pencil. That way you're sure the work is hot enough. I apply the pencil to one side of the work, and the solder to the other side.

9. Got to get a drop of light oil down into a tight place? Bend a few inches of stripped hookup wire so its end reaches down to the spot needing the oil. Then put a drop of oil at the top of the wire and watch it run down to the tight spot.

10. When troubleshooting, play the odds — check the most likely sources of trouble first. Here's the list, from most-likely to least-likely trouble areas.

(a) Operator error. Have the operator run the unit while you watch.

(b) Connectors, cables, and sockets. Wiggle, flex, and jiggle to locate faulty connections.

(c) Switches, motors, and relays. Clean the contacts.

(d) Power resistors, transformers, transistors, and diodes. Heat destroys.

Reprinted with permission from *The Hertzian Herald*, newsletter of the Monroe County (MI) Radio Communications Association (MCRCA).

*Continued on page 38*



## Read All About It!

*continued from page 37*

(e) Electrolytic capacitors. Tantalum electrolytics are more reliable than aluminum ones.

(f) Small transistors, diodes, ICs, and coils. Transistor and IC sockets fail far more often than the devices themselves.

(g) Non-electrolytic capacitors. Occasionally you'll find an open one, or one that leaks DC, but not often.

(h) Small resistors. It's rare to find a failure here, unless a failure somewhere else has caused excessive heating of the resistor.

### Capacitor capers

Choosing a capacitor for amateur applications often involves a little more than just getting the number of microfarads right and making sure the voltage rating is at least as high as required by the circuit. Take aluminum electrolytic capacitors, for example. Manufacturers don't like to advertise it too widely, but the better ones have a tolerance of  $\pm 20\%$  — and that's at room temperature. At 0 degrees F the capacitance is likely to drop by another 20%, so that "100  $\mu\text{F}$ " electrolytic may end up having a value of 60  $\mu\text{F}$ !

On the other hand, some electrolytics have a tolerance of  $-20/+80\%$ , so a unit marked 100  $\mu\text{F}$  may actually be 180  $\mu\text{F}$ . A few are marked "GMV" (guaranteed minimum value) — so the actual value may be anything above the marked value. Using an aluminum electrolytic in a timing or frequency-determining application is generally not good practice, unless you are prepared for variations on the order of a factor of two either way. Tantalum electrolytics, although more expensive, are available with tolerances of  $\pm 10\%$ , and they have value changes at 0 degrees F on the order of  $-10\%$ , so they may be acceptable.

At radio frequencies, the losses in most capacitor dielectric materials become severe. Mylar, polycarbonate, and ceramic types are generally not suitable above 1 MHz if the RF across them is going to be more than a volt or so. I have seen ceramic capacitors in

the output network of a QRP transmitter get warm to the touch, indicating a serious waste of power. We're talking less than 20 V rms at 7 MHz. Polystyrene capacitors fare rather well at high frequencies, micas are better, silvered micas better still, and air-dielectric capacitors are best of all.

Capacitor markings can be quite cryptic. Usually a three-digit number that ends in something other than a zero is telling you the first-digit, second-digit, and a multiplier, with the final value in picofarads. Thus 471 means 470 pF, and 223 means 22 000 pF, or 0.022  $\mu\text{F}$ .

Tolerance is often given after the value by a letter code. Here is the decoding chart:

F =  $\pm 1\%$   
G =  $\pm 2\%$   
H =  $\pm 3\%$   
J =  $\pm 5\%$   
K =  $\pm 10\%$   
M =  $\pm 20\%$   
Z =  $-20/+80\%$   
P =  $-0/+100\%$  (GMV)

Thus, a capacitor marked 104K is not 104 kilofarads, but 10 000 pF (or 0.1  $\mu\text{F}$ ) with a tolerance of  $\pm 10\%$ .

To add to the confusion, ceramic disk capacitors may have a three-character code following the value and tolerance code. The first character is a letter specifying the low-temperature limit:

X =  $-55$  deg C  
Y =  $-30$  C  
Z =  $+10$  C

The second character is a number specifying the high-temperature limit, in degrees Celsius:

5 =  $+85$  C  
7 =  $+125$  C

The third character tells the maximum capacitance change (in percent) over the temperature range given by the first two characters:

A =  $\pm 1$   
C =  $\pm 2.2$   
E =  $\pm 4.7$   
P =  $\pm 10$   
R =  $\pm 15$   
S =  $\pm 22$   
T =  $+22, -33$   
U =  $+22, -56$   
V =  $+22, -82$

Thus, a capacitor marked "333M Z5S" has a value of 33 000 pF, or 0.033  $\mu\text{F}$ , and a tolerance of  $\pm 20\%$ , and may be used over a temperature range from  $+10$  to  $+85$  C with a capacitance change not more than  $\pm 22\%$ .

L-C oscillators generally tend to drift down in frequency as the equipment warms up. This is due largely to thermal expansion of the coil form. To compensate for this drift, special ceramic capacitors may be used whose value decreases with increasing temperature. This negative temperature coefficient is indicated by the letter N followed by a number giving the capacitance decrease in parts per million per degree C. For example, a capacitor marked 180 N750 has a capacitance of 180 pF, and as the unit warms up from 20 C to 50 C (68 F to 122 F) this value may be expected to decrease by

$$30 \times 750 / 1\,000\,000 = 0.022 = 2.2\%$$

Ceramic capacitors specifically designed to have zero capacitance change with temperature are marked NPO (Negative/Positive: Zero).

### The Old Man

The guy they called The Old Man? Sure, I knew him. Well, it wasn't actually me — it was my buddy, Al. I think his family knew him from way back. However it was, three or four times during our sophomore and junior years of high school Al called me to say that he had been invited to The Old Man's shack because he "wanted to talk" — and would I like to come along.

The Old Man's shack was a two-car garage, partitioned into operating room, workshop, and storage area in about the proportions of 1-to-2-to-3. His rig consisted of three six-foot relay racks full of what appeared to be home-brew exciters, amplifiers, modulators, and power supplies. The rig was dark and silent, and he never turned it on while we were there. In fact, I never heard him on the air, and later, when I got home and looked up his call in the *Callbook*, it wasn't there.

His receiver, a Collins 75A-2, was always on, with CW signals mumbling softly in the background. Once, while

*Continued on page 54*



# The History of Ham Radio

*Part 14: The Hoover era comes to an end.*

*Radio conferences, now commonly referred to as the Hoover Conferences, became yearly affairs and the assembly of 1925 was no exception. The conferences were called to bring about a degree of cooperation between various branches of the developing radio industry.*

Primarily to cope with the ever-increasing proliferation of interference problems in the interest of the listener and to mediate the differences between broadcast license applicants, government regulation became of paramount importance.

This, the fourth conference, was to be the last one called by the Secretary of Commerce. Radio's destination would be completely revolutionized in the subsequent two years by bringing about the needed legislation to replace the 1912 law.

Convening in Washington on November 9th, 1925, some 700 participants from all sections of the United States were present — and only for three days. They soon came to unanimous agreements on all major issues. The spirit in which various questions were approached signified common understanding of the direction which radio broadcasting was to take in the future.

Reprinted from *73 Magazine for Radio Amateurs*, May 1981, where this was originally reprinted from *QCC News*, a publication of the Chicago Area Chapter of the QCWA.

By the end of 1925, there were some 600 radio broadcast stations operating in the United States with no enforceable regulations. The opinions of the conferees were practically unanimous in favor of not limiting the number of broadcasting licenses issued, but actually to diminish the stations on the air so that the radio listener would benefit from the reduced interference generated.

What was the radio amateur's position? At the conference, the question of greatest interest to amateurs concerned the retention of the 150- to 200-meter band. Its takeover was threatened by the broadcasters. However, after serious consideration, no additional channels were allocated for the broadcast service.

Several recommendations were promulgated for the amateurs:

1. The opening of a 100 kHz band from 83.3 to 85.7 meters (3,500 to 3,600 kHz) to amateur phone operation, the usual quiet hours applying.
2. The opening of the so-called amateur 80-meter band to naval aircraft.
3. The prohibition of spark to all waves below 200 meters.

These recommendations were to take effect after formal announcement by the Department of Commerce.

Meanwhile, the regulations of the past year remained for amateur guidance.

Mr. Hoover, in his opening remarks at the conference, referred in particular to the progress radio had made during the few years of development.

"It has been suggested that the remedy [for congestion] lies in widening the broadcasting band, thus permitting more channels and making it possible to provide for more stations. The vast majority of receiving sets in the country will not cover a wider band. Nor could we extend it without invading the field assigned to the amateurs, of whom there are thousands and to whom constant experimentation in radio development is so greatly indebted. Radio in this branch has found a part in the fine development of the American boy, and I do not believe anyone will wish to minimize his part in American life. And if we did absorb the higher amateur band from 150 to 200 meters, it would not even solve the immediate difficulties ..."

The conference went on record recommending the following:

1. That no new stations be licensed until, through discontinuance, the number of

*Continued on page 55*



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the February issue, we should receive it by November 30. Provide a clear, concise summary of the essential details about your Calendar Event.*

## NOV 1, 2

**ODESSA, TX** The West Texas ARC will host their 2002 Hamfest on Friday and Saturday, November 1st and 2nd, at the Holiday Inn Center, 6201 E. Hwy. 80, Odessa TX. Hamfest hours will be 5 p.m. to 9 p.m. on Friday, and 8 a.m. to 5 p.m. on Saturday. VE exams will be available. Plenty of free parking spaces. Admission \$3, tables \$10 with one free ticket per vendor. For more info contact *Craig Martindale W5BU*, 1719 Rosewood, Odessa TX 79761. Phone 915-366-4521 or E-mail to [w5bu@arrl.net](mailto:w5bu@arrl.net).

## NOV 9

**MONTGOMERY, AL** The Montgomery ARC will host the 25th annual Montgomery Hamfest and Computer Show in Garrett Coliseum at the South Alabama State Fair grounds located on Federal Dr. in the Northeastern section of historic Montgomery. Admission is \$5, free parking. Inside flea market set up 3 p.m. to 8 p.m. Friday evening, November 8th; and 6 a.m. to 8 a.m. November 9th. Doors open to the public from 9 a.m. to 3 p.m. CST. VE exams on site beginning at 8 a.m. Testing by CAVEC. Bring original and a copy of your current license, picture ID, and \$3 fee. Talk-in on 146.24/84, W4AP. Ragchew on 147.78/18 with phone patch \*up/#down, 449.50/444.50, and 449.45/444.45. Flea market reservations are required to assure tables. Tailgaters welcome at \$2 per vehicle space. For more info write to *Hamfest Committee, c/o 7173 Timbermill Dr., Montgomery AL 36117-7405*; or phone *Phil* at 334-272-7980 after 5 p.m. CST. E-mail [\[k40zn@arrl.net\]](mailto:k40zn@arrl.net). For late breaking news and events, visit [\[http://jschool.troyst.edu/~w4ap/\]](http://jschool.troyst.edu/~w4ap/).

## NOV 16


**NEWTONVILLE, MA** The Waltham ARA and the 1200 RC will sponsor an Amateur Radio and Electronics Auction, 11 a.m.-4 p.m. at Newton Masonic Hall, 460 Newtonville Ave., Newtonville MA. Talk-In on 146.640. Admission \$2. Door prizes, snack bar. For directions and more info, visit the Web at [\[http://www.wara64.org/wara/auction.htm\]](http://www.wara64.org/wara/auction.htm); or contact *Eliot Mayer W1MJ*, 24 Hamilton Rd., Belmont MA 02478. E-mail [\[w1mj@amsat.org\]](mailto:w1mj@amsat.org), or phone 617-484-1089.

## NOV 16, 17

**FORT WAYNE, IN** The 30th Annual Fort Wayne Hamfest & Computer Expo, sponsored by the Allen County Amateur Radio Technical Society (AC-ARTS), will be held at the Allen County War Memorial Coliseum at the corner of Indiana 930 (Coliseum Blvd.) and Parnell Ave. Open to the public 9 a.m.-4 p.m. EST on Saturday, and 9 a.m.-3 p.m. EST on Sunday. Vendor setup is Friday evening and Saturday morning. Admission is only \$5 (good for both days) at the door ONLY. Parking is \$3. There will be 1,000 commercial and flea market tables all under one roof, containing both new and used radio, computer, and general electronics items. The guest speaker this year will be FCC Special Council for Amateur Radio Enforcement, *Riley Hollingsworth*. *Dick Isely W9GIG*, ARRL Central Division Director, will be providing a forum; and *Dan Henderson N1ND*, ARRL Contest Branch Manager, will also be present. Vendors include several international ham equipment manufacturers. Activities will include many forums and

meetings, and VE exams on Saturday. Shuttle bus service will be provided to and from the commuter airport (Smith Field) and shopping centers. Talk-in on 146.88(-). For more info, leave a message on the answering machine at 260-484-1314, and you will be contacted. You can also send an SASE to *AC-ARTS/ Fort Wayne Hamfest, P.O. Box 10342, Fort Wayne IN 46851-0342*; or visit the Web site at [\[http://www.fortwaynehamfest.com\]](http://www.fortwaynehamfest.com).

## NOV 30

**EVANSVILLE, IN** The Evansville Winter Hamfest will be co-sponsored by Electronic Applications Radio Service, Inc., and The Ham Station. Everyone is invited to attend this event which will be held 8 a.m. to 2 p.m. Central Time, at Vanderburgh Co. 4-H Fairgrounds Auditorium in Evansville. Admission only \$5. Talk-in on EARS Wide Area Repeater Network 145.150(-) Evansville or 146.925(-) and 443.925(+) Vincennes (all use 107.2 tone). Backup on 145.110(-) Evansville, tone 107.2. ARRL-VEC exams will be held at 12 noon. Plenty of commercial vendors and indoor flea market space. Free tailgating with admission ticket (weather permitting). Breakfast and lunch will be served by Old Post ARS. For more info visit the Web site at [\[http://w9ear.org\]](http://w9ear.org). 8 ft. tables are \$8 each (includes chairs). Wall tables (while they last) are \$10 each. Add \$2 per table if payment is received after November 15th. Setup times: 5 to 9 p.m. Friday; 6 to 8 a.m. Saturday (all times Central). For table reservations or info, contact *Neil WB9VPG* at 812-333-4116 or 812-327-0749; or write to *Neil Rapp, 2744 Pinehurst Dr., Bloomington IN 47403*. E-mail [\[ears@w9ear.org\]](mailto:ears@w9ear.org). 

## NEVER SAY DIE

*continued from page 4*

is the only water that can be taken into the body without damage to the tissues. Distilled water is water which has been turned into vapor, so that all its impurities are left behind. Then, by condensing, it is turned back to pure water. It is the only water which is pure — the only water free from all impurities."

Dr. Charles Mayor of the Mayo Clinic:

"Water hardness (inorganic minerals in solution) is the underlying cause of many, if not all, of the diseases resulting from poisons in the intestinal tract. These minerals pass through the intestinal walls and get into the lymphatic system, which delivers all of its products to the blood, which in turn distributes them to all parts of the body. This is the cause of much human disease."

Dr. David Kennedy, D.D.S., wrote: "Even tap water invariably contains a variety of poisons such as chlorine,

chloramine, asbestos, pesticides, fluoride, copper, mercury, and lead. The best way to remove all these contaminants is by distilling."

One of the best buys I've found is the \$119 still from NutriTeam Distillers, Box 71, Ripton, VT 05766, 800-785-9791. Or check [\[www.steamdistiller.com\]](http://www.steamdistiller.com).

## Club Talks

Well, it's taken a while, but I'm finally

*Continued on page 58*



# Constructing a 1296 MHz Omni Slot Antenna

*Last time, we described the use of N connectors as the better choice for operation over 1 GHz, rather than the UHF connector. Also shown were the methods for using a directional coupler to measure forward power, reducing high power RF to a lower value, allowing lower power attenuators to measure higher power transmitters, and reversing the directional coupler to make SWR/return loss measurements.*

The SWR/return loss measurements are used to properly adjust an antenna and bring it into agreement at the frequency of operation for best transfer of power from the transmitter to the antenna, with a minimum of power being reflected back towards the transmitter — i.e., best SWR/return loss means maximum power being radiated by the antenna.

The SWR measurements are the same whether it is at a frequency of 4 MHz or 1296 MHz; it's just that the tools look a little different. You could use a directional coupler at 4 MHz, but the device would be quite large in respect to one for 1296 MHz. As frequency is increased, the wavelength factor gets smaller, making devices for higher and higher frequencies smaller compared to their associated wavelength.

SWR vs. return loss details are as follows: If the SWR is 3:1, then the return loss is 6 dB. If 2:1, then 9.5. If 1.5:1, then 14. If 1.3:1, then 17.5. If 1.1:1, then 26.

Construction of an antenna for 1296 MHz presents several problems, and while there are many yagi-type designs and other types, they require exacting construction be followed to deliver a quality device. While a directional antenna is very desirable, I wanted to have an omnidirectional antenna to be able to work my local friends easily and see what is going on with 1296 MHz. Also, I wanted a design for the antenna that I could follow and construct with my drill press and hack saw and files. I had to violate this rule a bit.

The omni design, I discovered, was an adoption of several designs by both British and U.S. amateurs and their approaches to construction. I don't take credit for the original material, just for the dimensions in my

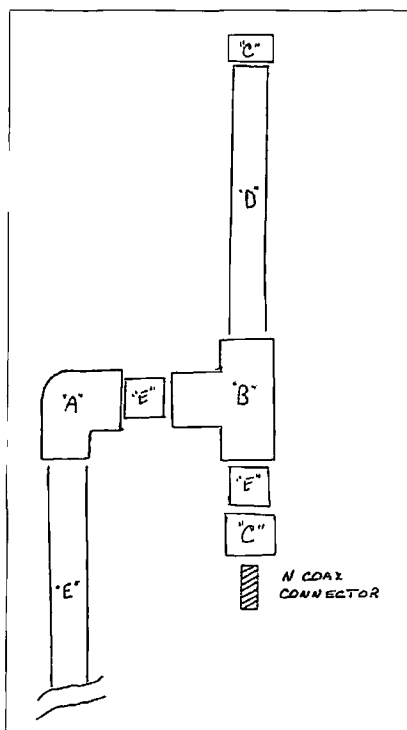
finished product. This was started with the main tubing, which proved to be of a nature that I could not find a comparable diameter tube in thinwall brass standard tubing U.S.-made, compared to the British metric equivalents. A search of other construction articles gave me some confidence to continue onward and attempt construction of the Alford slot antenna.

In the construction of the 1296 MHz Alford slot antenna we located a section of brass tubing from an all-service hardware store, San Diego Hardware. This store is quite unique, as it stocks many hard-to-find items, besides a great selection of quality tools in every size and shape. I have never seen a store have so many different sizes of screwdrivers, as well as precision and specialty items such as taps, dies, and even washboards. Quite a unique store — a must if visiting San Diego. We purchased a 6-foot section of 1-1/4 inch brass tube stock, enough material to construct two slot antennas. See Fig. 1 for slot antenna details of construction.

The design specifications were confusing, as the original construction article used metric dimensions and presented problems in finding stock of proper wall and diameter sizes. We selected the 1-1/4-inch brass tube as a compromise, and took a few other liberties with slot width and length variations of the antenna.

The best description of the antenna I can make is that it is a slot cut into the front side of a round tube. The extra slot length is used to advantage to allow exact frequency adjustment when tuning the antenna. Feeding the antenna balanced in the center is accomplished with a length of 141, 50 ohm hard-line coax slightly longer than the

antenna. One end of this 141 hard-line is cut into a balun of one-quarter wavelength which feeds the center of the slot by being soldered to it. The balun as constructed has



**Fig. 1.** Showing full omni slot antenna that Kerry N6IZW and I constructed including PVC pipe mount using excess remainder of the inch and one quarter PVC schedule 40 pipe length as a mast to attach to the 90 degree plumbing elbow. A = 90 degree SCHD 40 1-1/4" elbow. B = SCHD 40 1-1/4" "T". C = SCHD 40 1-1/4" end cap. D = 1-1/4" fluorescent light shield "tube guard." E = SCHD 40 1-1/4" PVC pipe.



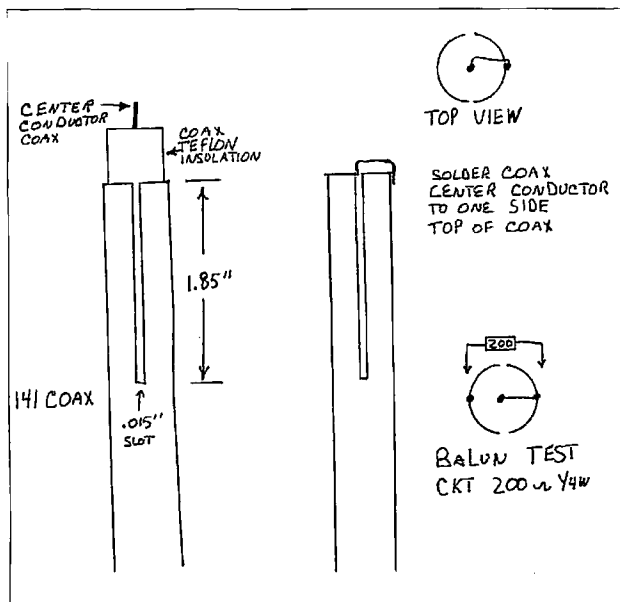


Fig. 2. 200 ohm balun construction using a length of 0.141 solid copper coax. Length of 0.141 coax should be long enough to attach balun and make connection to coax connector at bottom of antenna. Balun slot length should be 1.85 to 1.9 inches long.

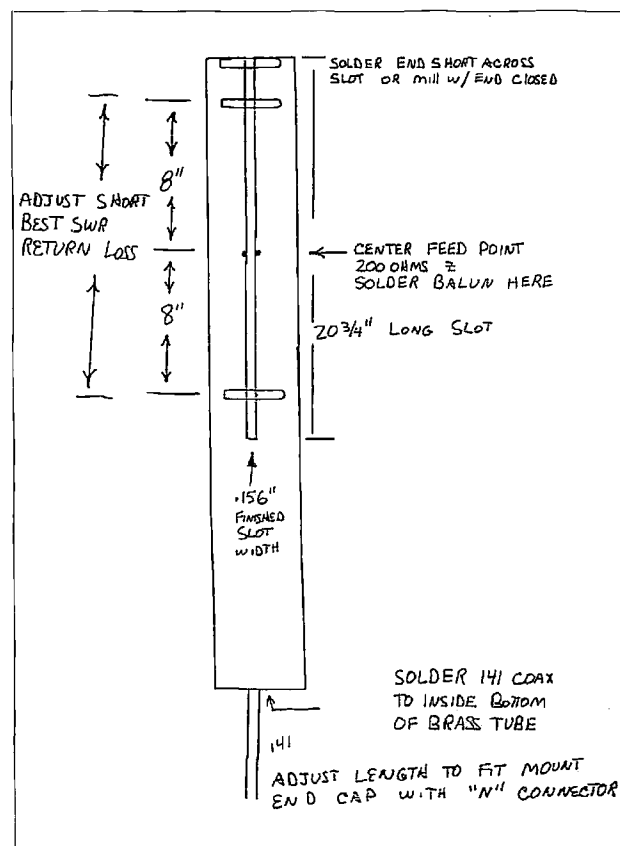


Fig. 3. Slot antenna construction. Note top end of brass tube has short on end. Second short determined when frequency measurements for 1296 made and short placed 8 inches above center feed balun on antenna 1 constructed. Bottom short same scenario as top short and adjustment short spacing, 8 inches in my construction test.

impedance of 200 Ohms. (See Fig. 2 for balun construction details.) If you want to test the balun for operation, solder a 200 Ohm 1/4-watt carbon resistor on the balun end and take a return loss/SWR measurement at frequency of operation 1296 MHz. You should see a 15 dB return loss or better or SWR of 1.5 to 1 or less.

The balun is routed to the rear of the 1-inch tube to eliminate its affecting the slot by being close to it as it is routed out the bottom of the antenna. Construction of the balun is to cut front and back-sides of the outer solid copper shell of the 141 coax cable 180 degrees apart, forming two distinct one-quarter wavelength sections of coax; we will call them leaves. Before cutting the balun I removed one-half-inch of outer copper from one end of the 141 coax and left the inner Teflon protruding on the end of the cable. Use a longer section of 141 coax so that if your cut fails to be accurate, or you want to do it over, you have the length of 141 coax to accommodate the feed. Better longer than shorter.

To make the balun slot cut, I used a Dremel tool with a cutting wheel that was 0.015 inch thick. I marked the length of the quarter wavelength balun slot at 1.85 inches and held the coax in a vise to eliminate movement, and while wearing safety glasses I cut each side of the 141 coax slit with the Dremel tool. Try to not cut into the Teflon center insulator — do the job slowly and as precisely as possible. I had to practice on the balun slot-cutting procedure two times before I was satisfied I had done a good job on the final cut.

Use an eye magnifier to be sure you have cut through the copper eliminating shorts in the narrow slot. Use an X-acto knife to trim and remove bits of copper in the slot, and try as best as you can to keep the inner copper and Teflon in contact. Then, when you are satisfied that the balun slot is the proper length and not shorted by a bit of copper, cut off the Teflon end of the 141 coax cable trimmed to the end of the copper leaf section, leaving the center conductor intact. (See Fig. 3.) Now, fold over the center conductor, cutting off the excess and solder it to the center of one copper quarter wave leaf section. Leave the other quarter wavelength section open at the end of the slot. This end of the balun will be soldered to the center of the slot on the brass tube feeding RF to the center of the slot.

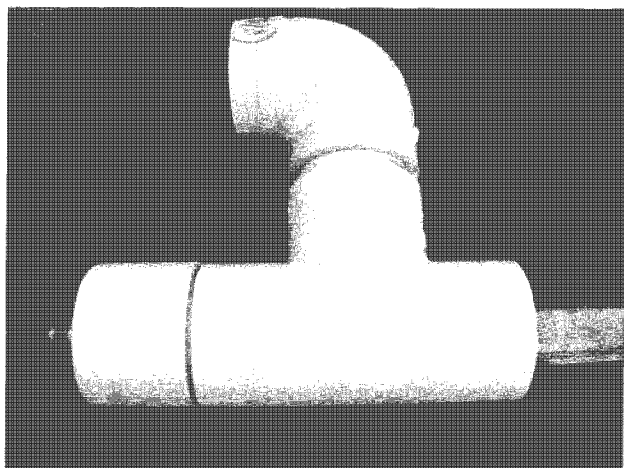
This completes the construction of the quarter wavelength balun. Set it aside till construction of the antenna is ready for final assembly.

Preparation of the main slot antenna construction can be done at home, but we decided to send it out to a machine shop to cut the slot length in the 1-1/4-inch tube front side. We had our slot cut into the tube face approximately 0.156 inch wide for a length of 20-3/4 inches. The machine shop cut the slot for each antenna for \$15 each. We forgot an important issue here. Do not cut the slot on the far end of the brass tube. Leave a short section of tube effectively shorting the end of the brass tube. It will provide rigidity to your antenna. We had our slots cut through to the end of the tube. This resulted in the slot bowing open starting at the cut spacing of 0.156 inch to something like 0.250 at the far end of the tube.

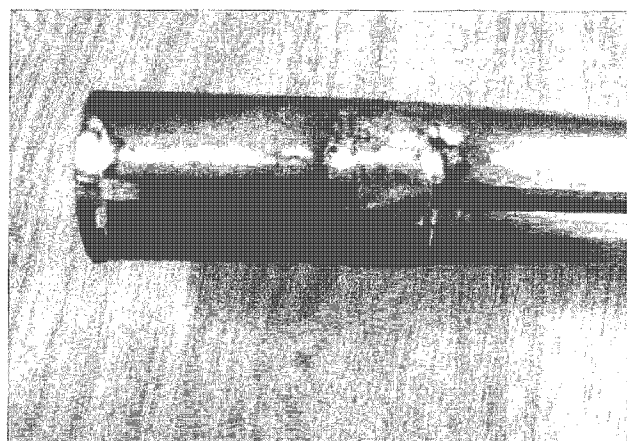
To bring the slot into the desired dimension of 0.156 inch, I put a set of six automotive hose clamps on the slot element length and adjusted to make the slot conform to specifications. It sprang open again when I removed them. I re-applied the hose clamps, heating the brass section and clamps on a gas range to maximum heating of the brass till it was near as hot as the two burners on the stove could provide (15 minutes).

Slowly reduce the heat over an additional 15-minute low heat cooling procedure. Then turn off the burner and let air-cool for an hour or so. Do not cool with water. Once cool, the brass has been re-annealed and should show few springing properties. Kerry N6IZW developed this part of the procedure for annealing the brass to conform to desired width.





**Photo A.** PVC mount using a 90 degree "T", end cap, and an elbow; all 1-1/4 inch PVC SCHD 40 fittings.



**Photo B.** Top of finished slot antenna showing end short and final short after adjusting the slot to resonance at 1296 MHz. Same as Fig. 3.

The slot dimension should be close to 0.156 inch. Remove the clamp at the top end of the slot and solder a short across the open end of the slot to hold it at 0.156 inch. Remove the remaining clamps and check the slot dimension. I use a file to smooth out the remaining length of slot to make it uniform. The file width was 0.145 inch and worked well to smooth out the slot width to 0.156 inch.

With the top of the slot shorted or left closed, measure down the length of the slot for a length of 20-3/4 inches. Mark this spot as the starting end slot length. It is longer than we require but gives you some fudge room to adjust without repositioning the center feed balun. Form the length of 141 coax and balun to fit near the center of the slot and then formed back to the rear of the inside of the tube. When all is formed properly with the 141 coax hard-line, tin the exact center left and right side of slot center, and

solder the ends of the two leaves of the balun to the slot center sides. Gently do a little jiggling to final-form the end of the 141 coax coming out the bottom of the brass tube. Solder it well to the bottom of the brass tube to form a rigid holding structure to support the coax fixed firmly to the bottom of the tube. Most important is that the balun end be free from stress from the coax connector feed end, and anchored well in the rear of the slot antenna (see Fig. 3).

Now comes the fun. If you do not have test equipment, then you might want to use the stock dimensions I used in my construction. If you have a microwave power meter and directional coupler as described last time in my "Above & Beyond" column, then you're ready to check SWR, or rather return loss.

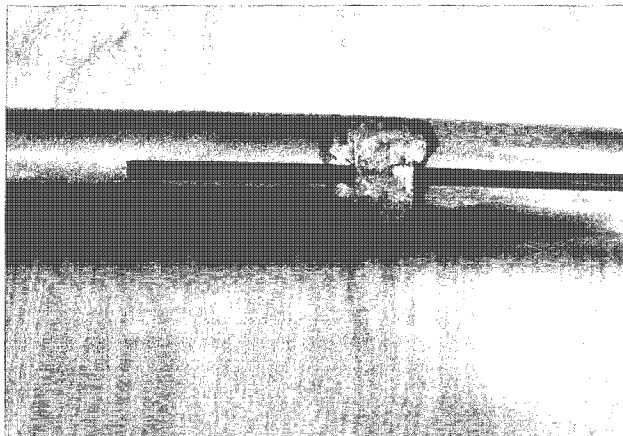
With the directional coupler connect it backwards from normal power measurements. This will allow reflected power to

be measured at the sample port. With +10 dBm @ 1296 MHz forward power to the antenna I read a -4 dBm power reflected with no antenna or a short placed on the coupler antenna connection. After replacing the antenna as a load, check the meter reading. Next, solder small strips of copper across the slot to decrease the slot length; then trim to frequency. Symmetrically change the length of the slot above and below the center balun tap point. In my antenna measurement, I found 18 inches to be very near total slot length for best return loss (best SWR) @ 1296 MHz. Probably could have done better, but it was good enough for me. At 8 inches length (above and below of center balun tap point). I measured -19 dBm power with +10 forward power used for the test. Subtracting the -4 with a short gives me a return loss of 15.

*Continued on page 56*



**Photo C.** Center feed of slot antenna showing each edge of center feed point soldered to 141 balun side contacts, or "leaves."



**Photo D.** Bottom end of slot antenna showing end of cut slot and soldered final adjusting copper strap forming final adjustment for 1296 MHz.



# HOMING IN

Radio Direction Finding

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## From Radio Camp to the World Championships

*A summer camp for transmitter hunters? Why not? Most hams have heard about Radio Camp licensing courses put on by the wonderful Handi-Ham organization in Minnesota. Last year I told you about Radio Camp for teens in Texas, where they get licenses, win handie-talkies, and do some UHF transmitter hunting with them. This year brings the first Radio Camp for lovers of international-rules on-foot hidden transmitter hunting, also called foxtailing, radio-orienteering and ARDF.*

In August, eleven would-be champion radio-orienteers from seven states went to Europe, where they spent one week of intense training at an ARDF Radio Camp, then the next week at the Eleventh ARDF World Championships (WCs). These enthusiasts were Dick Arnett WB4SUV, category M50, Erlanger, KY; Bob Cooley KF6VSE, M60, Pleasanton, CA; Dave D'Epagnier K0QE, M40, Longmont, CO; Bob Frey WA6EZV, M50, Cincinnati, OH; Marvin Johnston KE6HTS, M50, Santa Barbara, CA; Harley Leach KI7XF, M60, Bozeman, MT; Nadia Mayeva, D35, Mooresville, NC; Gyuri Nagy KF6YKN, M40, Maspeth, NY; Larry Noble N0NDM, M40, Aurora, CO; Charles Scharlau NZ0I, M21, Chapel Hill, NC; and Csaba Tisztartó, M21, New York, NY.

While there, they came closer than ever to hearing our national anthem played during the awards ceremony. I'll have more on the championships later, but first, the camp.

### Hard work in Hungary

Regular "Homing In" readers will recognize Gyuri Nagy KF6YKN as the Hungarian ham with U.S. resident status who has been teaching and training stateside hams in the fine points of ARDF since USA first went to the WCs in 1998. Before that, he had won medals in Hungary, where his original call is HA3PA.

With the ARDF WCs taking place in Slovakia this year, the logistics were perfect for Gyuri to set up a week of intensive

training just beforehand in his native hometown of Pecs. (It's pronounced "PEDGE" to rhyme with "edge.") Helping him were his wife Susan and his sons Daniel and Thomas.

Rules of the International Amateur Radio Union (IARU) for WCs permit each country to enter a maximum of three persons in each of the five age categories for males and four age categories for females. In categories with more than three applicants for our team, selection was based on performances on the First USA ARDF Championships last summer in Albuquerque and the Second USA ARDF Championships last spring near Atlanta.

ARDF Team USA members are among the best foxtailers in our country. Nevertheless, they are new to the sport, as are most

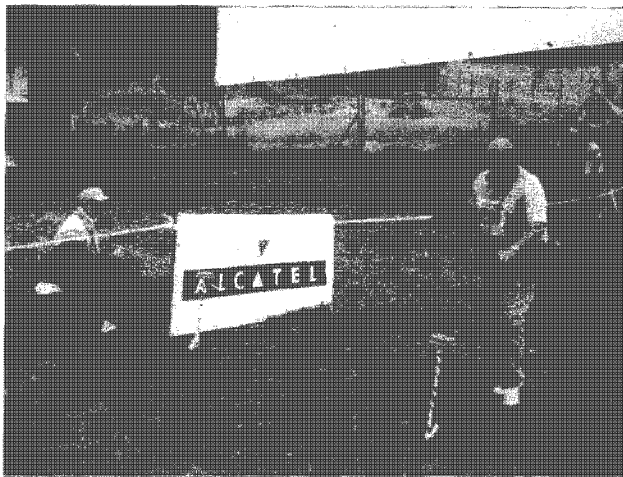


**Photo A.** Around the dinner table after a busy day of training in Hungary are members of Team USA and Team Australia. The empty chair belongs to Karla Leach KC7BLA, who took the photo. Clockwise around the table from there are Bryan Ackerkly VK3YNG, Bob Cooley KF6VSE, Marvin Johnston KE6HTS, Dick Arnett WB4SUV, Adam Scammell VK3YDF, Bob Frey WA6EZV, Harley Leach KI7XF and Bruce Paterson VK3TJN. Standing in back are hosts Gyuri, Thomas, Daniel, and Susan Nagy. Csaba Tisztartó, another team member and native of Hungary, was not present that evening. (Photo by Marvin Johnston KE6HTS)

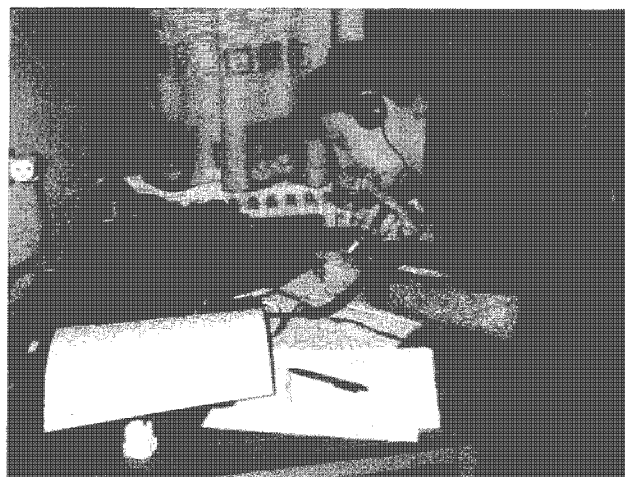


**Photo B.** ARDF Team USA shows the flag at the WC opening ceremonies. In the front row, left to right: Dave D'Epagnier K0QE, Csaba Tisztartó, Larry Noble N0NDM, and Marvin Johnston KE6HTS. Back row: Dick Arnett WB4SUV, Bob Frey WA6EZV, Karla Leach KC7BLA, Charles Scharlau NZ0I, Nadia Mayeva, Bob Cooley KF6VSE, and Harley Leach KI7XF. Not pictured: Gyuri Nagy KF6YKN. (Photo by KE6HTS)





**Photo C.** Larry Noble NØNDM crosses the 80m finish line and gets ready to register his SPORTident chip. (Photo by KE6HTS)



**Photo D.** Once a DXer, always a DXer. Bob Frey WA6EZV operates special events station OM9FOX. (Photo by KE6HTS)

stateside hams. So it was good that six members of Team USA and three members of Team Australia were able to take the extra time to attend both Gyuri's training camp and the WCs (**Photo A**).

"Gyuri did a superb job," says Team USA Co-Captain Dick Arnett WB4SUV. "I think I did much better as a result of the training camp. It wasn't just from hunting lots of transmitters, but he also would sit down with us and explain the types of courses — classic, nonclassic and so forth. As soon as Gyuri looks at a competition map, he can usually tell approximately where the transmitters will be, and even which numbers will be where, because of the distances that must be traveled by the various category competitors. We benefited from his years of experience."

Agreeing with Dick was long-time orienteer Bob Cooley KF6VSE, who celebrated his 60th birthday during the WCs. "It's important to make a lot of mistakes while practicing, and work so that you don't make them in the future," he explained. "I got the opportunity to get fooled in a variety of ways."

Marvin Johnston KE6HTS was on his way to his third WCs. "Before the training camp, we went to the Hungarian national championships," he says. "From what I understand, they weren't differentiating between Hungarians and visitors. If one of us had taken first place, he would have been the Hungarian national champion!"

"That wasn't likely," Marvin continued, "because the Hungarian team candidates had the advantage. They had been practicing on the same terrain for a week. Saturday was the 2m hunt, Sunday was 80 meters, and both were on the same map. The courses

were quite long. Not surprisingly, Gyuri took a second place."

Team USA's other co-captain was Bob Frey WA6EZV, who exclaimed, "I was just tickled to death with that camp! It was fantastic! We had two full courses in a day sometimes, and Gyuri pretty much set them all up himself. We students were so thankful that we got together at the end and bought him a new digital camera."

"Gyuri concealed the transmitters very well," KF6VSE added. "He put the flag about 10 meters away. That was to keep passers-by from seeing the flag and stealing the transmitters."

### On to the main event

The week of training passed quickly and soon it was time to head for the WCs. This year's site was Tatranske Matliare in the High Tatras of the Slovak Republic, at about 900 meters elevation. Two Slovak hotels there had been taken over for the exclusive use of competitors.

WA6EZV explained how their caravan got from Hungary to Slovakia. "The Aussies went up with us too. Gyuri drove his vehicle. He also arranged a minivan that I think belonged to Csaba's sister. Csaba drove that. There was another car that took the rest of the people up."

Although the site is called the High Tatras, the elevation was only about 2,000 feet, much less strenuous than the 7,000-foot mountains near Albuquerque last year. "The weather was gorgeous," says WA6EZV. "There was no rain until after the last hunt, so we didn't have to contend with lightning. Since it was usually lightly overcast and cool, you could run without overheating."

Tuesday, September 3 was a day of practice and the opening ceremonies (**Photo B**). "At the practice, the Aussies discovered that they had left their RDF antennas in their packing tubes down in Hungary," says Bob Frey. "Dick and I loaned them our spare tape measure beams. We had doubled up on almost everything, except two-meter receivers, which was to cause us problems later. I had two 80m sets but only one 2m set, which is ironic."

For the first time in the ARDF WCs, SPORTident chips were used for accurate registration of each competitor's total time and the times to each fox (**Photo C**). Time limits for events at the World Championships are typically two hours. This time, they were two and a half hours. Apparently the Slovak organizers knew that their courses were extra difficult.

Bob Frey says, "At our team meeting before the first event, the last thing I told everyone was to be sure to head for the finish early enough to avoid going overtime. But five went over anyway. The courses were the hardest I've ever seen."

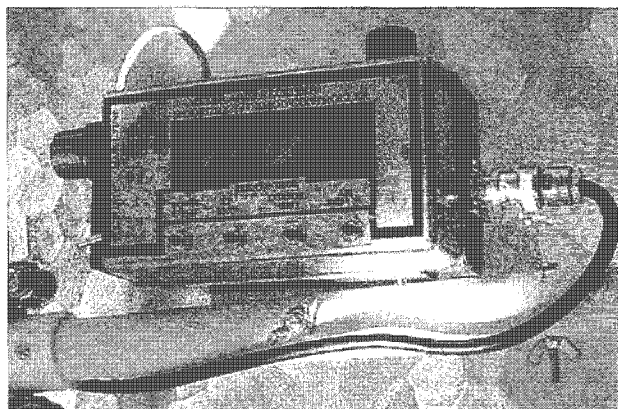
"The training camp was very helpful for guessing running times," says WB4SUV, "but this 2m course fooled me. Coming from the fox farthest out I had 37 minutes to make it home. I thought I could get to anywhere on the map in that time, but it was unbelievable what I had to go through."

"There was only one good route," Dick continued. "It was a very small corridor of a trail, and if you missed it as I did, you had a grueling experience because there was only heavy vegetation and swamp. I had to go uphill at about a 45-degree angle, and it was a long uphill. I was sinking almost to my knees every step because there was water





**Photo E.** Nadia Mayeva, Team USA's best performer in terms of placement, stands at the 80m finish with Charles Scharlau NZ0I (left) and co-captain Dick Arnett WB4SUV (right). (Photo by KE6HTS)



**Photo F.** This PIC-based VHF tuner, code-named "OzMod," attaches to the cover of the Ron Graham RX1 ARDF receiver. (Photo from presentation by WB8WFK and K5ATM)

coming down the hillside. When I got back to the hotel, I threw my shoes away."

### For want of a coil ...

WA6EZV crossed the 2m finish line with 45 minutes to spare, but that was because he could only hear and hunt two of his four required foxes. "The local oscillator (LO) coil on my Ron Graham receiver apparently went funky," he says. "It worked fine until we got to camp in Hungary. Gyuri had all his transmitters operating down near 144.0. Because the RX1 doesn't cover the entire 4 MHz of the band, I had to retune the LO down. It worked fine until the last day of the camp, then it quit. Harley Leach KI7XF and I worked and worked on it and we thought we had it fixed, but on the training day I could tell it still wasn't working right."

"Charles had a spare RX1, so we took it to the practice on Tuesday. It was fine, or so I thought, but it turned out that his receiver also wasn't tuning down low enough. The bottom end of his tuner was the homing beacon frequency, and the fox transmitters were lower than the homing beacon. They were so strong that I was copying them OK on the image frequency."

"Using Charles' set on the 2m hunt, I was able to hear a weak image of one of the transmitters, so I tracked that down. There I heard another weak image. I found that, but I couldn't hear anything else, so I went to the finish."

Not surprisingly, Gyuri Nagy KF6YKN led Team USA in the 2m standings. Running in the hotly contested M40 category (males ages 40 through 49), he placed fifth out of 50 competitors with an excellent time of 1:13:22. Only two Russians, one Slovak, and one Estonian did better in that category. Another notable performance was that of 60-year-old Harley Leach KI7XF, who was

17th out of 30 in the new category for men 60 and older. He was featured on the cover of *73 Magazine* for January 2002.

Thursday was a day off for the competitors, with cultural and sightseeing adventures. Some found time to operate special event station OM9FOX (**Photo D**). Rested and recuperated, the competitors were up early on Friday for the 80-meter hunt. Their initial bearings led most of them up a very steep hill right out of the starting corridor.

"You had to see this hill," WA6EZV recalls. "You'd think you were near the top, but then you'd make a bend in the road and — oh, no — more hill. Fox MO5, my first, took me 50 minutes to find even though it was only two miles away. The wet hill in China two years ago was a cakewalk compared to this one. The whole course had to be at least 10 kilometers. A couple of foxes were way out on a mountainside."

Later, KE6HTS discussed routes with two of the medalists in M50 category. Oleg Fursa UT4URL of Ukraine, who won the gold in 1:28:14, indeed ran more than 10 kilometers. Tchermen Gouliev UA3BL of Russia took silver with a time that was less than two minutes over Oleg's, but Tchermen's route was only about 8.5 kilometers.

It was this day that Team USA came within two minutes of bringing home its first medal. Nadia Mayeva, a former European ARDF champion who now lives in North Carolina, took forth place in D35 category (women ages 35 through 50) by finding her four required transmitters in 1:49:02 (**Photo E**). She was edged out by Han Chunrong of China, who won the category bronze medal in 1:47:20.

"Out on the big course, Nadia thought that she was doing so poorly that she almost gave up," WB4SUV reports. "As it turned out, she missed the gold by only a little more

than one fox cycle." USA also posted team scores in four categories on 80m. While they weren't medalworthy, they were better in some categories than Austria, Belarus, Bosnia-Herzegovina, Croatia, Estonia, France, Japan, Korea, Netherlands, Norway, Romania, Slovakia, Sweden, and Yugoslavia.

Karla Leach KC7BLA represented USA and IARU Region 2 on the International Jury overseeing the competitions. Her assignment was Course Marshal at one of the foxes. "She was out in the woods for several hours," says WA6EZV, "and they didn't give her a chair or anything. She borrowed an air pillow from me just to have something to sit on."

There's a lot more to tell about USA's trip to the 2002 WCs, including stories about breaking into a castle, the defective transmitter, sinkholes, and a bee sting. All that will have to wait until next month. Meanwhile, you can find out which countries won medals and view all the Team USA members' course times at the "Homing In" Web site.

Many thanks to the ARRL Foundation and the Colvin Award Fund for providing entry fees of Team USA, which included food and lodging during the competition. Team members paid for their own training expenses and airfares.

### An important correction

September's "Homing In" covered the 2002 Dayton Hamvention Foxhunt Forum, featuring presentations by several hams on technical and tactical RDF topics. One was Gerald Schmitt KK5YY of Los Alamos, New Mexico, who described a low-cost PIC-based phase locked loop (PLL) tuner for the Ron Graham RX1 two-meter ARDF

*Continued on page 56*



# The Physical QSY

*Some people never move far from home, while others find that moving is a repeating event. If you face a move, you may want to add a few things to your "To Do" list that affect your ham radio operations.*

As you read this, I'm in the process of moving to Cheyenne, Wyoming. Cheyenne is a beautiful place in the high plains about 1,000 feet uphill from Denver. I hadn't worn a cowboy hat since Rin-Tin-Tin was a popular black-and-white television show. However, that got remedied in July as I helped provide communications for Cheyenne Frontier Days — both hat and boots are required parts of the official uniform. As you might guess, I'm quite pleased to be here, but I still find moving to be an onerous task. However, being the cock-eyed optimist that I am, I try to find the silver lining that surrounds the dark clouds.

Naturally, the usual and customary issues that surround moving are pretty self evident. I need to find a house that the XYL finds acceptable. Need to arrange for utilities and insurance on the house. There's daycare for the kids, tags for the cars, etc. When it comes to ham radio, there are some readily apparent issues to be resolved. Need to file a change of address with the FCC on my license and program the local repeaters into my radios. But with every challenge there is an opportunity, so what are the opportunities that present themselves with a move?

Here are a few to consider. If you read the columns recently about setting up an emergency HF operations, you may find these categories to be a bit familiar. This is probably because a permanent move and setting up a temporary station are pretty similar.

1. Ham shack — Most shacks tend to evolve with equipment being added after the latest hamfest and parked in whatever location seems available at the time. Moving presents an excellent opportunity to redesign the ham shack in a logical and operator friendly way. Which desk/table/hutch do I want to use for my main operating position? Do I want to have my main computer in the ham shack, or is that more of a family

computer, now? If so, do I want to network the ham shack computer to the other computers? Is this a good time to go wireless networking? In my case, I'm anticipating separating my APRS system from my PACTOR and HF system. I'm thinking seriously of putting APRS on both VHF and HF with a possible Internet gateway. If so, this will not require the same type of desk based layout as my main HF system since it will be primarily an automatic system. It will be located so that the feeds from my weather station are readily available, but won't require a comfortable place to sit for long periods since I don't expect to be spending a lot of operating time sitting at these radios. For APRS it's more a check of the data and move on. On the other hand, by moving APRS out of the way, I can make my main HF station much more comfortable with more room to spread out. Of course this also has me thinking about what gadgets or gizmos would fill up the space I cleared. One last issue to consider is determining the perfect location for the ham shack. I like to be at or near ground level so I can get a proper ground into the shack. I also like to be slightly separated from the family so the noise from the shack doesn't bother them, yet close enough that they don't feel that I'm trying to avoid them. Finally, the new location must fit in with the overall geographic plan as determined by the XYL.

2. Antenna system — With the altitude of Cheyenne, I figure a little antenna altitude should go a long way. I have a little over an acre and there are some pine trees on the property, so there are some possibilities. At this point I'm considering a vertical and a dipole for general HF operations as a starter. Later, I'm hoping to add a tower with a Yagi for at least 10–20 meters with a 2-meter/440 MHz vertically polarized beam over that. On top of everything I'd add a vertical 2-meter antenna for APRS. Of

course there would be a few additional miscellaneous antennas that would sprout on occasion, but the main farm would be pretty complete with these.

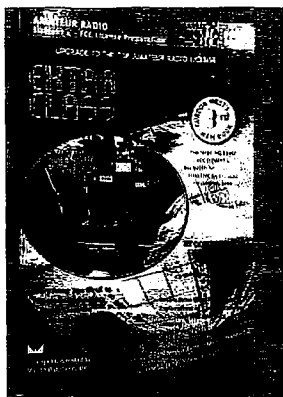
3. Power system — As long as I'm redoing everything, I might as well check out my power system. The preliminary approach I'm going to take is to power the APRS and VHF systems from gel cells that are connected to the A & A Smart Charger. That should keep me running for quite some time in the event of a power loss. While I do have a deep cycle trolling battery for the HF rig, I haven't yet decided on how to recharge that. Cheyenne does have two natural forces that are plentiful — sunshine and wind — and it should be possible to tap into one of those, but I haven't decided which direction to take. I am leaning toward solar power strictly because there are no moving parts, but given the winds we have, a wind turbine might be more effective. When I do decide, I am planning on mounting the deep cycle battery outside in a weatherproof case so that any hydrogen vapors will be dissipated without creating a fire hazard.

4. Evaluation of potential hazards — Each area has its own potential hazards to face. Along the coast there is the danger of hurricanes. In California, earthquakes present a threat. Here the most common events appear to be weather-related, with high winds and severe storms with tornadoes being among the most severe. To me this presents several issues. The first is that SkyWarn will be a key player and I will need to get oriented to the procedures used in this area. Second, I need to evaluate my station in terms of high wind issues. If I do erect a tower, I need to make sure that it is rated high enough to deal with the expected wind velocity. My dipole will need to be installed so that it has enough give in the wind so as to prevent the wire from being stretched and

*Continued on page 56*



# NEW PRODUCTS



## Gordon West Extra Class Prep Materials

Gordon West WB6NOA has released his new Extra Class Element 4 license prep book and audio cassettes.

"The all-new Extra Class test is actually easier to prepare for because some of the complicated old questions were eliminated, and all new questions are actually reworked Advanced Class and old Extra Class questions," says West, who has identified the most new questions on the Extra test as the simple new rules and regulation topics.

The book and tapes cover all 801 questions and answers, and an upbeat description of the correct answer. West also reveals some of his classroom secrets on how to spot many of the technical correct answers BEFORE you begin to work out the problems on your calculator. All calculator keystrokes are clearly explained for those hams who may be a little rusty on trig!

All Gordon West training materials are published by Master Publishing, Inc., and all of this materials are available at ham radio dealers throughout the country and via mail order from the W5YI Group by calling 800-669-9594. Gordon West Technician and General Class books for beginners are available at Radio Shack stores everywhere in the USA.

West regularly travels widely, attending hamfests and offering training classes, and his on-the-air activities exemplify his active participation in the Amateur Radio Service.

## 2002 Christmas Key

In what is becoming a ham radio Christmas tradition, Morse Express has released its 2002 Christmas Key, a gold-plated miniature brass key that will double nicely as a Christmas tree ornament.

The Morse Express key is a fully operational miniature key, hand-machined from solid brass and plated in gold. It measures a tiny 2-3/8 by 1-1/8 inches at the base and weighs a surprising five ounces.

The 2002 key incorporates several improvements over the 2001 key, including miniature binding posts for cable connection, chased wiring on the bottom, and an ebony knob. The base is a little longer to accommodate the binding posts, and a little thicker for added stability. All of the usual adjustments (trunnion bearing tension, lever spring tension, and contact spacing) are available by means of gold-plated screws with matching locknuts, and the indented knob is very easy to use.

The machining and assembly processes were done by hand. The base of each key is engraved with Morse Express's "Speedy Key" logo and "Christmas 2002." This is a limited edition of 250 keys, and each bears an engraved serial number on the base.

The 2002 Christmas Key is \$59.95 plus s/h, and is available only from Morse Express. Photos and more information are available on the Morse Express Web site at [www.MorseX.com], where you will also find secure ordering facilities.

For further information, call 303-752-3382 or E-mail [n1fn@MorseX.com].

## Breakthrough Product Designed for Monitoring Professionals

AOR USA has created the AR-ONE, a new wide-range communications receiver capable of monitoring any frequency from 10 kHz to 3.3 GHz with excellent sensitivity, while providing maximum user flexibility.

"The AR-ONE Communications Receiver was designed and built with computer operations in mind," said Takashi "Taka" Nakayama KW6I, vice president of AOR's North American operations. The AR-ONE has two RS-232C ports on its rear panel. "This will allow the joining of multiple AR-ONE units. As many as 99 AR-ONE receivers can be controlled by a single computer."

The AR-ONE was conceived as a "breakthrough" design. Its many features include ten VFOs; 1,000 memory channels; an ultra-stable frequency reference oscillator; selectable tuning steps and resolution down to one Hertz; the ability to monitor AM, NFM, WFM, USB, LSB, CW, and data modes; a triple-conversion superheterodyne front end; adjustable BFO; high intercept, multi-IF signal output ports at 10.7 MHz or 455 kHz; and more.

Operating features include the ability to control all functions by computer and most functions through the control head. The unit can communicate many settings and readings to the user including such items as signal bandwidth and the strength of a received signal.

The rear panel has two RS-232C ports, an "N" connector antenna terminal, two BNC inputs, power input, speaker output, and the IF taps.

"The AR-ONE is designed for professional users, such as governments, military applications, law enforcement, laboratories, and others who require the ultimate in a sensitive, wide-range receiver," said Mr. Nakayama. "At this time, we do not have plans to produce a version of the AR-ONE that has cellular frequencies blocked, so it cannot be offered for sale to the general public in the USA," he said.

With the ability to link up to 99 receivers, the AR-ONE may be an unparalleled resource for surveillance operations and high end monitoring. The unit can be installed in base or mobile operations.

The user has the flexibility to tune in increments of a single Hz, making most of the widely-used available RF spectrum tunable to the AR-ONE. Its ability to read out signal strength in user-selectable dBμV or dBm units makes direction finding more scientific, and its ultra stable frequency reference brings a lab-quality readout to the user in day-to-day operations.

Rear-panel IF outputs allow for secondary signal processing and analysis. One example of a use for this feature is, AOR has developed a working prototype of an APCO 25 digital signal decoder that should be available in the near future. In addition, other accessories or computer programs make visual signal display possible, including graphic displays for vector analysis.

"The AR-ONE may well redefine what is possible in terms of monitoring," said KW6I. "We believe governments need enhanced tools for surveillance to keep pace with communications developments. One area of interest is the ongoing battle against terrorism across the world. We hope the AR-ONE can play a role in bringing those efforts to a quicker conclusion."



## New and Improved Early PSK31 Program

*You may not realize it, but we are terribly spoiled with all the new and great software made available for our hamming pleasure. If you want to take a trip into the not too distant past, you will be amazed just how far things have come. In addition, you will find an old program that will perform just about as well as the new stuff with a Big Plus. It will work under Windows 3.1, 95/98 and NT, and, get this, with a computer as slow as a 486/33. You just need one with a soundcard.*

I broke out the latest version of the G3PLX PSK31 software the other day and got it up and running, which was not really difficult. The tedious parts are tuning and totally manual operation.

Even with the skinny little tuning window on this program, you can develop a technique for ease of tuning. The remaining problem is need for type-ahead and flexible macros. There is a well developed enhancement by WD5GMR. aptly named the PSK Front-end. You get these two programs together, do a little organizing, and you will be surprised how well this combination works.

Before I go too far, I must admit to getting in a bit of a hurry as I was setting this up and didn't have all my ducks in a row. As most of us do, I was excusing my less than crisp operating procedure to a ham at the other end. Specifically, I had not gotten the macros organized the way I prefer.

The contact had never seen this "antique" software and one of his parting comments was, "I bet that makes you feel like you are working with spark-gap." Tongue-in-cheek comment of course, but it helped put a few ideas in perspective for me. Chiefly, 4 or 5 years is like an eternity in the evolution of digital modes: so much has happened so quickly.

You may want to look into these programs for more than just nostalgia purposes. They will run under Windows (I ran them in Win95) with a lightweight CPU and minimum RAM. Also, if you take a look, you will find versions for the PSK31 software written for other platforms such as DOS, Linux and even a version to be used without the soundcard by use of the EVM module.

### How to get it going

You can download everything you see in use here as freeware. For the PSK31

software, go to *The Chart* on the Web [<http://kb7no.home.att.net>] and click [<http://aintel.bi.edu.es/psk31.html>]. You will likely be drawn in by some of the great info that you never knew existed about PSK31. Click on the Available Software link and you will see what I mean about so many varieties available.

To get the other software to really make this project fly, again on *The Chart*, click on: [[www.al-williams.com/wd5gnr/pskgnr.htm](http://www.al-williams.com/wd5gnr/pskgnr.htm)]. Once there, you are in for another information harvest. You will need the Help File, but that comes with the PSKGNR download and installation. The Help file is in HTML, so it will open in your browser when you need it. I found it was a great help as I was organizing the macros. Also, you may want to download the PTT program. Nice to have that automated.

Installation goes pretty much by the book. The PSK31 software installs in the root directory and the PSKGNR magically finds its way to the Program Files as it installs. If you install the PTT package, it goes with the PSKGNR file.

As I look back at this, I may have missed something. The Setup menu in PSK31 needs your callsign and then asks you to designate a PTT serial port. It appears the latest version 1.08 has its own PTT control written in. I have everything installed and it works, but to keep some of the confusion down to a mild roar, at the time of this writing, I brought up the PSK31 program all by itself and sure enough, the PTT controls from that software just as well as from the PSKGNR front-end. They do not fight each other as the transmit control from either program keys the rig. I will leave it alone. See what works for you.

Anyway, the setup in the PSK31 program is very elementary because the operation of

the software is very bare-bones. Works well, just lacks for the niceties of convenience.

Enter the need for the PSKGNR front-end. This program is a marvel in its own right. You will find once you have configured this program to your liking that about the only thing you will miss may be rig control. It even does some semi-automatic logging that really is a help.

### Many features made to order and some DIY

The first thing to impress many of us is how one program can search around a computer with so many files and directories, home in on another program and execute it without any hints from the operator. At least, as best I recall now, after the installation of the programs, when the PSKGNR was booted, it automatically found the PSK31 program and booted it at the same time. There is a place under Tools/Options to insert the path and it is there now, so if it could not be found by "sniffing" for some reason, the path could be written in.

So much for magic. Under that Tools/Option pull-down you will find many decisions to make. Fortunately, the Help File will do its job for you and get you through the rough spots.

If you go to Tools/Options/Options, you will find a lot of choices. Two that are a big help is to check "Macro Palette on start" and, if you have a CD callsign database, check "CD Lookup Window on start." If you can display these windows, you will be surprised what great crutches they can be to tell what is going on.

One of the reasons for the palette window for the macros is there are no little boxes for the other station's callsign and name. You enter these manually when a



window appears after hitting F12. No, there is no double-click to capture those bits of info.

However, once the other station's callsign is entered, your macros work (we will get to that) and you can hit the Lookup Now button in the callsign window and the CD will feed the information to the other little window. Really is magic and it gets better with some work.

One more item before we hit the macro department. The program does not really interface directly with a log program but provision is made to send the current QSO info in ADIF format to a file of your choice for reading or import into a log program at a later time. If you are like me and keep a running log, this answers at least fifty percent of the need. Beats paper and pen.

What's more, when I went to send the QSO shown in the screenshot to the log file, I paid closer attention than I had on the first experiment and found I could, at that point, enter all the information I ever wish to enter by taking advantage of the pop-up screen that asks details such as frequency, time started and time finished, etc. In all, I entered 12 fields, then when I viewed the info, I found there were only about two of them in need of alteration before I would have imported them into the log program of the hour. I did the entry manually, but if this were to be a permanent mode of operation, it wouldn't take much to make the entry nearly automated.

### Macros — the indispensable tools

The macros are not all written out for you as with some other software packages. Some macros come ready to run and seem to be written in stone. I have about a half dozen that make me feel naked when they are not available.

I wrote these and left the originals intact and confused myself with the disorganization. How this comes about is simple. The PSK31 software has 10 macros addressed directly by function keys and you can't mess with these. The PSKGNR program has Shift+F and Control+F keys available and you can alter almost all of these. The one I could not find a way to alter or copy is the Compose screen Clear command, which is CTRL+F9.

After a bit of reorganizing and study I decided the best solution was to put my favorites in the Shift+F category. That made for the least upset in my usual operating routine. For a time I had popular macros spread every which way and could not find them when needed.

If you have successfully written macros in plain language format, this is not much of a stretch. The Help File will give you the information you need and lists the commands that are available. Allow yourself an hour or so to master this, and then operating is a real pleasure.

Now, about that tuning problem. The waterfall is small. That is the only way you can describe it. The width is approximately 500 Hz as I measured it. Nothing like the 2 to 4 kHz we are spoiled with these days.

You will find you can help your cause a lot by listening for the pitch of the stronger signals. It won't take long to realize by their pitch whether they are above or below the frequency covered by the waterfall.

Then, as you cross a PSK31 signal, you will notice the tuning indicator above the waterfall changes color and becomes yellow. When the color is right you are close. If you are close enough the AFC will home in on the signal, but it is a bit slow, so it is best to tweak the tuning to get as close as possible.

I found something while tuning that I don't think I ever realized when using this program in the beginning. You can click a signal

## TRANSMITTER LOCATION



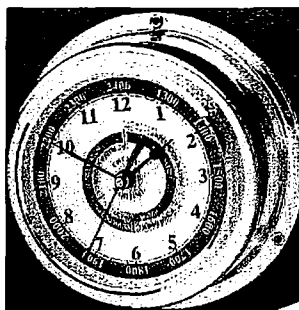
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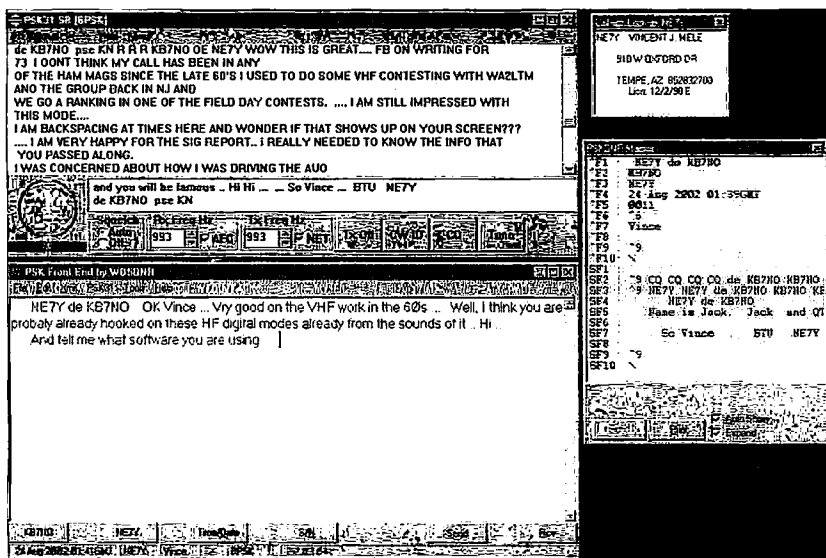
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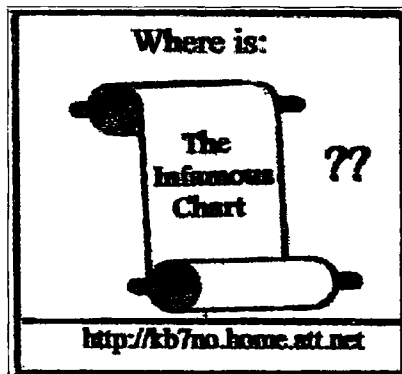
**Fig. 1. Keeps on Tickin'.** These two seemingly ancient programs working hand-in-hand will surprise you. Real performance with PSK31 on Win 3.1, 95/98, and NT, even with a 486/33! The upper left pane is the original PSK31sbw as we used in the beginning. This is an update to vers. 1.08, but remains the austere, no-frills descendent of what gave the original thrill to so many at the beginning of the digital revolution. Life became much easier when along came the PSKGNR front end allowing customizable macros, type-ahead, and so many features we take for granted nowadays. The upper right is the window displaying the info from the QRZ disk. Works with all the popular databases. Below that is the macro palette which displays as an on-screen "cheat sheet." I wrote and placed all my favorite macros in the Shift+F section to reduce brain fatigue. Some macros are written in stone with the regular function keys and a few of these were duplicated. You can use at least 30 macros as you desire. The tuning is accomplished with the tuning display in the lower left of the PSK31sbw program panel. Though the waterfall is only 500 Hz wide and very shallow, you can carefully place your cursor on a signal trace, click it, and it will center for you. When you are properly tuned the indicator in the round tuning window will change color and go vertical as shown. On idle, an IMD reading is given in this round area. There is no "box" to display the other station's callsign or operator name, and this is a good reason to display the macro palette (optional). Entry of the callsign is manual into a pane after hitting the F12 key. From there you can do call lookup either from disk or the Internet. Plus, when finished you can log to an external file in ADIF format. And, if you are really adventurous, there is provision for contest exchanges with increments. Everything but rig control. Have fun.

trace in the waterfall and the spot you click will suddenly be brought to the center under the tuning indicator. It takes a little more

care than what we have become used to these days but it works.

A little hint: Check and adjust the "Tx Freq Hz" audio frequency (NET) to match the "Rx Freq Hz" (AFC). These, even with the NET box checked at this station, did not track (by a bunch). If they do not read the same, the other station will never know you are transmitting to him.

I found this software, when treated with some tender respect and given a proper application of setup and macros is a great performer. There is no problem with reception and the audio drive works out just fine as it was set for other software. The signal reports were great and it is a blast to use. Give it a try sometime. If you weren't around in "the beginning," you will see for yourself what the pioneers endured as they journeyed through that early digital wasteland.



**Fig. 2. Find the Chart.**

## Minor irritant resolved

Many of you recall the ongoing operating system war within this shack. I have espoused the merits of using Win98se for general ham use and it is, overall, the most successful of the various Windows operating systems. Some hams report excellent results with Windows XP, and there are even a few who are using the dastardly Windows Me which gave me fits and definitely does not work with quite a bit of the popular hamware.

The local problems started to reappear in a slightly different form as I added more software packages to this machine. There are at least 45 different utilities, ham programs, and the necessary word processors, graphics programs, and other such necessities installed, and I have been warned that too many programs is a definite no-no.

The major problem now? The blue screen error-syndrome. A lot of it can be traced to background ready-to-run software that apparently is continually pawing at the gate trying to get out while I am doing something else.

I discovered a fairly simple solution while tracking down another utility a short time ago. I downloaded a registry repair program named "Registry First Aid." It is a relatively small easy to use utility that quickly and efficiently removes the many unwanted registry lines that confuse the system. It is shareware with a price tag of \$21 for registration. If I use it often enough, the blue screens are a thing of the past. The link to download this shareware is now on the Web in *The Chart*.

"Often enough" translates to several times a week. It only requires a few minutes each time around and really relieves the tension. I was told by someone in-the-know that Norton has a package that includes a registry repair module that bears looking into. I am sure there are other similar programs, but when you find one that suits your needs such as this one you will be one happy computer user.

## Web site with *Chart* easier to find

At this writing, the KB7NO Web site [http://kb7no.home.att.net] that contains *The Infamous Chart* which used to accompany this column has been up and running for about two months. Finally, all the ducks got in a row and it can be found with a search on Yahoo by simply entering KB7NO as the search.

This may sound unnecessary when the

*Continued on page 57*



# Dayton Highlights

*Dayton Hamvention 2002 has come and gone. For the most part, the event went just fine. Except for the weather! This time, on Friday afternoon, we got buckets of spring rain. But it was a very cold spring rain. Everyone was huddled under sheets of plastic trying to keep warm. In fact, it was the coldest spring on record in the state of Ohio! Had the temperature dropped a few more degrees, we'd have had snow! But even with the rain and low temperatures, everyone seemed to have a good time; even the vendors in the rain-soaked flea market.*

Once again, Ten-Tec was the attention leader at this year's Hamvention. The new Orion HF transceiver generated a line of hams waiting to ask questions and to play with the radio. But for us with fewer bucks to spend (the Orion comes in at \$3,300), the new Argonaut V produced just as much attention as the Orion.

The Argonaut V is the latest in a long line of QRP transceivers produced by Ten-Tec. Starting with the Argonaut 505, then the Argonaut 509, perhaps the most popular QRP transceiver ever made. The 509 remained the company's namesake until the Argonaut 515 came along. The 515 was a stripped down version of the popular Triton series 100 watt HF transceivers. There were rumors of a "super QRP" rig coming from Ten-Tec when the 515 was discontinued. The radio turned out to be the Argonaut II. But a lackluster review in *QST* put the screws to the Argonaut along with the high power version, the Delta II. Let's hope the Argonaut V does not follow in the footsteps of the Argonaut II!

## The Argonaut V — a closer look

When the crowds thinned out enough late Saturday afternoon, I managed to get my hands on the prototype of the Argonaut V. It's lightweight, coming in at five pounds. The dimensions are 2.75 by 8.5 by 9.7 inches, making it suitable for a backpacking QRP operation from your local park.

The Argonaut V is constructed entirely from surface mount components. For those of us who are accustomed to seeing boards stuffed with through-hole parts, the Argonaut V seems quite empty inside. With a little bit of pushing and shoving, you could

get the entire radio inside a much smaller package.

The Argonaut V shares the front panel and most of the sheet metal work of Ten-Tec's 6N2 transceiver. The difference is in the silk screening of the front panel. Of course, the rear apron is different as well, since this is where the PA is mounted.

I guess you could call the Argonaut V a multipurpose radio. It will operate SSB, AM, FM, and of course CW, using Ten-Tec's famous break-in keying. This may be the first QRP transceiver that can operate AM transmit right out of the box. Those boys on 7290 will be in for a treat!

The Argonaut V will also operate all the latest digital modes including PSK31. In fact, the Argonaut V is available with optional TXCO for industrial strength stability.

Why, there's even an optional fan for the rig, too. A fan for a QRP rig? Yea, I asked the same question and was told that some of the digital modes such as RTTY and SSTV are used at QRP levels, too. Under constant key-down conditions such as these, a small fan helps keep the PA transistors cool.

Like the Jupiter, the Argonaut V is a software-defined radio. You can easily add new features to the radio by downloading the latest firmware from Ten-Tec.

Did I mention that there's a choice of 34 software-defined DSP-controlled filters? In addition to the DSP filters, there's memory scanning and band scanning. And, oh yeah, let's not forget about the general coverage receiver, too.

You can have this and a lot more for \$749. Add the TXCO for an additional \$54 at the time of purchase.

I suspect that the Argonaut V will be a winner with the QRP gang!

## QRP RF amplifiers?

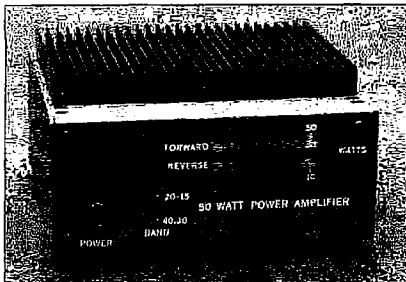
There were two at Dayton this year. The first one was the long awaited amplifier for the K2 by Elecraft.

The amplifier mounts to the inside top cover of the radio. The top of the case then holds the heat sink. Designed to produce up to 100 watts of RF, the new amplifier will help Elecraft attract new customers.

Robert Freiss N6CM introduced a small amplifier to match the K1 transceiver. Here are some specifications:

- Operation on five bands, 40, 30, 20, 17, and 15 meters.
- Only two low pass filters are needed for the five bands.
- Provision for automatic band switching is included.
- Power output of 50 or 100 watts, depending on version.

*Continued on page 58*



**Photo A.** The 50 watt amplifier shown operates CW only on the 40-, 30-, 20-, 17- and 15-meter bands. It is pretty easy to build for the builder of moderate experience.



## Your Turn for a Coil Winder

*continued from page 15*

### Notes

1. See *Building a Universal Coil Winding Machine*, by David J. Gingery, ISBN 1-878087-10-X, published by David J. Gingery Publishing and available from Lindsay's Technical Books, P.O. Box 538, Bradley IL 60915-0538, telephone 815-935-5353, Web site [http://www.lindsay.com]. \$8.95 plus postage. (Amazon.com carries many of Gingery's works, but not this particular booklet.)

2. Machine parts and supplies are available from several industrial supply houses. One that I've dealt with and that will sell small quantities to individual purchasers is MSC Industrial Supply Co. Orders may be placed via their Internet ordering site: [http://www.mscdirect.com]. Table 1 shows parts available from MSC. 73

## Automotive Battery Voltage Monitor

*continued from page 21*

power supply voltage from 10V to 16V to test the circuit. The LEDs will light over the voltage ranges determined by the voltage dividers described earlier. If transition voltages different from those designed are observed, check for proper installation of R2, R3, R4, R5, and D1. Now there is an easy way to monitor voltages, with this automotive battery voltage monitor. 73

## No Place Like Ohm

*continued from page 29*

drops from 9 volts to 8.8 volts when a 2.2k load is applied, the voltage dropped across the equivalent internal resistance is 0.2 volts and the current causing the drop is  $8.8V/2.2k$  or  $4 \times 10^{-3} A$ . The internal resistance is calculated to be  $0.2V/4 \times 10^{-3} = 50$  ohms.

A complex circuit may seem to be intimidating, but it can be simplified by calculating the equivalent resistance of all the parallel branches and then solving for the equivalent series circuit.

In Fig. 3, the equivalent resistance is found by calculating the equivalent resistance of R2 and R3 in parallel, call it R2'. The parallel equivalent of R5 and R6 is found, call it R6'. R4 and R6' are added, call it R7'. Then the equivalent of R2' in parallel with R7' is calculated and added to R1 to produce the equivalent resistance of the network.

Ohm's law is basic to electricity, and it's a law that hasn't been broken; it hasn't even been bent. It isn't always obvious where to apply Ohm's law in a complex circuit, but start by finding the equivalent resistance of all the parallel branches, and then adding the series elements together, and it will untangle. You can always just measure the voltage, but when you have to know the power that will be dissipated or what's going to happen when you apply a load, it's necessary to know the internal resistance. Ohm's law to the rescue. 73

## Solid State Junk Box Thermometers

*continued from page 32*

The zener D8 being 6.2 volts, we need a total resistance of R6, R7, and R8 of 5.166k ohms to provide the wanted 1.2 mA. That implies that trimpot R6 be adjusted to 3.395k ohms.

Reconnect the connection between M1 and R7. With the constant current set at about 8 to 9 mA, D8 will be operating near its listed test current.

As in the prior unit, the sensor is mounted to a three-way post to allow for remote operation when so desired. Do not forget the black shrink tubing on the sensor section if any testing of liquids is anticipated. The power source may be from plus 12 volts to plus 24 volts with no ill effects. It is brought into the enclosure with a miniature 1/8-inch jack so as to match one of the plugs on a 300 mA, plus 12 volt wall-wart power supply.

In both units, the components were mounted on an epoxy board with 100 thousandths centers, and the board mounted on the meter posts.

Now, you can show your dearest that you really did have a use for your "good stuff." 73

## Going Over a Gonset G-77

*continued from page 36*

### Conclusion

This was my first exposure to a G-77 Gonset transmitter. After working with it, I'm impressed with the quality of the mechanical and electronic design. Considerations were taken to make the transmitter user friendly and to make it suitable for mobile operation where vibration and temperature create a hostile environment. Yet, the VFO and tuning stability satisfy the application.

Perhaps one feature that is outstanding for a 1957 piece of equipment is the ease of tuning the VFO to a nearly exact frequency and I suspect that the transmitter's frequency was easily adjusted with the vehicle in motion. With the fairly broad PA tuning adjustments, "critical" tuning was probably not an issue.

If you happen to have access to a G-77 transmitter and are interested in either AM or CW, I suspect that you'll enjoy working with the Gonset. For CW operation, a key click filter will be required. 73

## Read All About It!

*continued from page 38*

The Old Man was rummaging in a junk box, I reached for the tuning knob to get the feel of this paragon of receivers, and he put me in my place with a curt, "Please don't monkey with the receiver."

Well, The Old Man had said he wanted to talk, and talk he did — for nearly two hours. He regaled us with stories of how the Radio Inspector had threatened to confiscate his spark transmitter one Friday back in '24 because he was interfering with Great Lakes shipping traffic, and by the next Monday he had his first vacuum tube rig on the air. He told of being an engineer at a local radio station in the '30s and climbing a 200-foot tower in the wintry darkness to make an antenna repair in time for Amos and Andy. We heard how he was in the South Pacific during World War II, training island natives who didn't know a word of



English to copy code by rote memory: dot-dash, write an A; dash-dot-dot-dot, write B; and so on. His eyes sparkled as the names of hams and radio men he had known rolled off his tongue by the dozen, and he seemed to expect that we should know these people as well as we knew our classmates in school.

Finally, he wound down and said, "Well, this is boring to you. Now, how would you boys like some radio parts, on the square?"

Al managed to say, "Sure!" but I could only hope that The Old Man read the wide grin that broke out on my face as a "Yes!" That first visit he gave me a power supply for my VFO. (I had just gotten my General.) It used a type 80 rectifier, so it must have been from the early '30s or late '20s. I had ridden my bike over, and it was a real struggle to keep that bulky thing under my left arm while managing the bike with my right.

By the second visit Al was driving, and we made sure the trunk was cleared out before we came. Good thing, too, because that time he gave me an old Hallicrafters AM transmitter; it must have been three feet wide and weighed over a hundred pounds. On other visits we came away with antenna tuners, microphones, transmitting tubes, and 500-watt power transformers.

He mentioned that the transformer secondary was 900 volts rms, and when I asked him what "rms" meant, The Old Man practically exploded: "How can you do anything in radio if you don't know what rms means?" So he sat me right down and explained it to me, and even though I was still a little shaky on the details, I told him that I understood it perfectly. Yes, sir!

Well, that's about all. We were supposed to see The Old Man again one Saturday in late May, but Al got a call on Friday that they'd taken him to the hospital, and a few days later we heard that he'd died. What with school and me starting my first job about then, I never did find out what happened to his garage full of stuff and that untouchable 75A-2.

Say, look — I've got to be getting home. The kid across the street is into computers, and I told him that if he'd come over after supper I'd give him

my old PC, and a modem and some other junk. It's funny — that kid comes over and gets me talking, and he doesn't leave for maybe two, three hours. I was telling him about my first computer, an Apple II — and I don't think he'd ever heard the name of Steve Wozniak before. And he didn't know what TTL levels were! Now, how's he going to do anything in computers if he doesn't know what TTL levels are?

## The History of Ham Radio

*continued from page 39*

stations is reduced and until it shall be in the interest of public service to add new stations.

2. That public interest as represented by service to the listener as opposed to private desire be the basis for the broadcasting privilege.

3. That further division of time among stations is not in the interest of public service and that the Department

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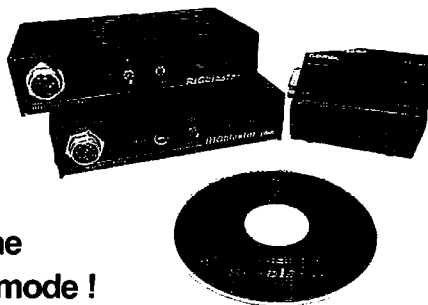
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decline to grant any more licenses until the present number of stations is substantially reduced.

4. That duplication of frequencies not be permitted in the case of stations of greater than 500 watts of power.

5. That advertising efforts via the broadcast be confined to the providing of meritorious programs which build goodwill for the sponsor.

6. That in issuing licenses, the Department uses discrimination looking toward the location of all broadcasting stations outside of congested centers.

7. That Congress be requested to enact new radio legislation vesting the administration of radio in the Secretary of Commerce, subject to approval of an appropriate court.

With the unanimous adoption of the many reports and resolutions at this conference, the radio industry at last came to the realization that a new law was a pressing necessity and new legislation must be prepared as the next big effort by Congressman White, and as was indicated by the report of Hoover's committee on legislation, could now receive unanimous affirmative consideration.

### **Fourteen years of haphazard growth come to an end**

Without a change in radio legislation in 14 years, especially since the end of World War I, Herbert Hoover had been in control and guided the radio developments as Secretary of the Department of Commerce. These were chaotic years for radio. The radio amateur was in the forefront of practically all major progress made in radio, especially with the support and cooperation of the Commerce Department.

With radio neglected by Congressmen, and court cases looming on the horizon, Herbert Hoover was now willing to surrender further attempts at assigning wavelengths and regulating times of operation and power of stations. He was ready to renounce the absolute control of broadcasting. 73

**Say you saw it in 73!**

## **ABOVE & BEYOND**

*continued from page 43*

not bad for my construction. Equivalent to about 1.5 to 1 SWR.

I mentioned using SCHD 40 PVC pipe and fittings to construct a mount and a protective cover. Testing the PVC SCHD 40 pipe, it proved unworthy of RF operation as it detuned the slot very bad. I then came across a fluorescent light plastic clear shield that is used to slip over fluorescent tubes of 4-foot length and it matched exactly the 1-1/4 inch PVC SCHD 40 fittings. Testing the clear fluorescent tubing it proved to have no effect when held near the slot, making a good lightweight cover.

I drilled holes for condensed water to evaporate out of the bottom of the PVC pipe cap when the coax connector was also attached. The SCHD 40 fittings used were an inch and one quarter "T", a 90 degree elbow, and two end caps. A length of SCHD 40 pipe 10 feet long was secured to serve as a test mount pole. Two short sections of pipe are needed to fit the end cap and elbow to the "T" fitting. Cut the length of fluorescent clear tubing to fit the dimensions. I used a small piece of cardboard to fit the brass tubing in the center of the clear tubing for rigidity, to prevent rattling around inside the clear tube.

The brass tube use was inch and one quarter brass with a fifty-thousandths-thick wall. The slot cut into the brass tube is approximately 0.156 inch wide and was cut 20-3/4 inches long. The actual slot was reduced with soldered copper straps to eight inches for best operation.

The slot antenna is quite forgiving, as Kerry N6IZW positioned his slot slightly different from mine and his worked just as well. I chose to space the feed in the center of the excessively long slot and tune from both ends with adjustable shorting straps. This, versus moving the feed to accommodate tuning adjustments. Both antennas work well and are used for the Microwave Net held every Monday evening on 1296.4 MHz, and the Palomar Club Repeater 146.73, at 9 p.m. every Monday except the 3rd Monday of the month. That's reserved for informal meetings at N6IZW's QTH at 7 p.m. The net is open forum for microwave activities for all interested amateurs to check in.

### **About SCHD 40 PVC pipe**

The pipe OD is 1.665 inches and its ID is 1.470 inches. Why, then, do they call it "inch and one quarter" PVC pipe? Trust me, it's printed right on the fitting, inch and one

quarter! Never figured that question out. The clear plastic fluorescent tube covering is 1.660 inches OD — neat, the dimension worked out for the PVC end caps. Call lighting retailers, especially commercial fluorescent light dealers, and ask for fluorescent light shields called "Tube Guards." They usually accompany a rotating black printed mesh to allow adjusting the light brightness on desk cabinet lights for commercial applications. You only want the clear cover, and it's very inexpensive — about \$3 for a 4-foot section.

Well, that's it for this time. I hope you have found another item to add to your antenna farm, as well as the methods to test it. 73, Chuck WB6IGP. 73

## **HOMING IN**

*continued from page 46*

receiver. It could also be adapted to other VHF sets that are based on the MC3362 monolithic receiver IC.

In the "Homing In" write-up, I mistakenly gave KK5YY sole credit for developing the tuner circuit. Actually, it was a joint project of Jerry Boyd WB8WFK and Mike Pendley K5ATM from nearby Albuquerque. They couldn't go to Dayton this year, so KK5YY gave the presentation.

Several radio-orientees from Albuquerque used prototypes of this tuner at the 2002 USAARDF Championships in April (**Photo F**). Jerry and Mike are still perfecting their PIC software and arranging for a circuit board, so the project isn't quite ready for publication. In the meantime, you can contact them directly for more information.

That's all for this month, except for a reminder to do some monitoring for those endangered Burrowing Owls if you live in western states. Their fall migration will be nearing completion as you receive this issue, but the tag transmitters will be active for another month or two. All the frequencies and information on the project are at my Web site. The URL is at the beginning of this article. 73

## **ON THE GO**

*continued from page 47*

eventually broken. Frequently this is accomplished by running one end of the antenna to a rope with the rope running through a pulley and the end tied to a weight. In wind the antenna can pull the weight up to relieve stress rather than placing the stress on



the antenna wire itself. Also, given the fact that the high plains do not have a lot of trees, and my antennas will be in the open, lightning protection will be more of a concern than I have faced in the past.

5. Opportunities for training and service - The most important part of the equation in amateur radio is the skills of the operator, and all of us must practice to keep our skills current. There is a very active ARES/RACES operation in this area as well as a lot of public service support. This presents an excellent opportunity to get used to the operating practices in the area as well as brush off some cobwebs. I surprise myself at times when I check into a net and realize that I'm just a bit rusty at some of the procedures. It happens to everyone — part of amateur radio being an art as well as a science.

6. Mobile opportunities — Cheyenne is not a large metropolitan area. One of the local jokes is that if you're late for a meeting when you leave the house you'll be on time when you get there. Every place I've gone has taken less than twenty minutes, so far. As such, there isn't going to be a lot of radio time on the way to and from work. Since the wife got a new(er) car, I have her hand-me-down and need to figure out how I'm going to configure it. My current plan is to have the standard 2-meter/440 MHz and 10-meter FM. This will give me some HF capabilities without taking up a lot of room and with a short enough antenna to clear the parking garage. Ten-meter repeaters are good for short QSOs with worldwide coverage, so it presents an excellent compromise.

7. Now, I know I'm forgetting something. The good news is that by the time you read this I'll have figured it out (I hope). In the meantime, if you'll excuse me, I have to pack. 73

## THE DIGITAL PORT

*continued from page 52*

URL for the Web site is published here, but if you do not have that available or are unfamiliar with the use of your browser, the use of a search by any of the services that use Google as their search engine can save a lot of frustration. I felt very fortunate that either a search for KB7NO or *The Infamous Chart* came back with our Web site at the top of the list. Mission accomplished! Now I just need to clean it up and make all those added attractions.

Speaking of search results, I was a little surprised when I came across a pleasant mention from a reader of this column in a

brief testimonial on the RigBlaster Web site. What caught my notice was the content where the user mentioned having been an inactive ham for a period of years, that he had read this column and was motivated to invest in the interface and start enjoying ham radio again. This is happening a lot these days. Digital modes have excited a lot of hams to dust off the equipment and rediscover ham radio. As I like to say, there ain't nothing so exciting to be found on TV.

### Related computer experience

For several years, I have fought off the notion that I should install Netscape 6.2. The reasons were that it ran poorly on a slow computer and the screen was crowded with many frames and difficult to read on a small monitor. Good reasons, but somehow I got backed into a corner when I allowed too much space to be taken up with the junk mail attack from folks who were promising to make me rich and famous since I have a Web site.

Old faithful Netscape 4.7 finally bit the dust and I was fortunate, it seemed, to do a reinstall and get the browser portion working well enough to go in search of a program to do mail. I didn't find what I was looking for in the readily available mail software, so downloaded the Netscape 6.2 and this faster computer with a 19" monitor is adequate to handle the chores comfortably.

However, as I looked at all the excess space-consuming bells and whistles, I realized this is definitely not for a small monitor even if you have the resources to run the package. On the other hand, I was pleasantly surprised with the added speed of file downloading and handling. Also I noticed the KB7NO Web site takes on a slightly different skew, nothing really problematic, but it is different. Of course, really different and something to always check with is the difference when viewing with Internet Explorer. I already found at least one instance where a layout appears just fine when viewed with Internet Explorer and is totally wrong with Netscape.

I am not sure how I drifted from Netscape to Web site appearances. Can you imagine this line of thinking 20 years ago? Life is just too complicated for us ordinary hams these days.

Enough for now. You guys (and gals) are doing a great job occupying the airwaves with this digital stuff. Give me a shout if I can help at [KB7NO@att.net]. 73, Jack KB7NO. 73

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## QRP

continued from page 53

- Class C amplifiers for CW operation only.
- Semi-break-in operation.
- Adjustable transmit-to-receive delay.
- No enameled wire to strip and tin.

Either amplifier requires approximately 2 watts of drive on 40 meters. The required drive power increases to about 6 watts on 15 meters.

Depending on how you build your amplifier, you can have either a 50-watt version or a 100-watt version. The choice is yours. The only difference is in the transistors used.

This little project generated a lot of interest. Not so much as an amplifier for a QRP radio, but as a nifty home-brew project! If it were not for that pesky FCC rule about selling amplifier kits, old Bob could have sold all that he could have brought.

And having said just that, there are NO kits to this project. I would suggest you stop by Bob's Web site at [<http://www.geocities.com/refriess/N6CM.html>], and see the project close up.

So, as you can see, there was quite a lot of slick new stuff for the QRP operator introduced this year. Of course, many of the new items were not mentioned here due to space limitations. Perhaps down the road, we'll highlight those that we missed in this issue. 73

## LETTERS

continued from page 8

Communications Service, PARTICULARLY WITH RESPECT TO PROVIDING EMERGENCY COMMUNICATIONS." Now look up the word "subvert," and next the word "emergency."

Any questions? I agree with Steve: "I'm sorry, but I don't think anyone's normal business includes a disaster or an attack. ... We need to have and project the idea that we are ready, willing, and able to do whatever is necessary to help out our community in times of emergency."

I couldn't agree more. 73

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## NEVER SAY DIE

continued from page 40

getting some invitations to give telephone talks to ham clubs. The talks are working out great. They're fun for me and draw good crowds for the clubs.

After doing this a couple of times I can see where I need to be better organized. I have so many things that I know will interest everyone that I tend to try to cover too much ground in an hour.

In the ham radio field I like to explain the real story of what's been called Incentive Licensing — how it came about, what was intended, and the unintended short- and long-range consequences.

Okay, so amateur radio's growth has come to a halt. And at a time when the pressure is on by any number of new services seriously in need of spectrum space. Are we just going to fade away, or is there some way we can get the hobby kick-started?

Then there's the lifetime of excitement and adventure that amateur radio has provided me. Like the King Hussein story and the around-the-world Operation World Wide flight where we visited hams in 26 countries and made thousands of 20 SSB contacts from the plane as we flew.

The breakthrough in health is too exciting for me not to bring it up.

My thanks to the Sheboygan County club for being good listeners and coming up with good questions.

## Double Teeth

Writer Brad Steiger, on a recent Art Bell Show, mentioned that skulls of giants had been dug up in Ohio that had double rows of teeth and horns. More forbidden archeology stuff, hidden away on a university's back shelves somewhere. A letter from reader William Bradford says that when he was cleaning the clay off some Ohio skulls he came across a whole group of supposed Indian skulls which had double rows of teeth, but no giants and no horns.

When a new road is being built they scrape off the top layer of dirt. If any remains are found a state university is given a short time to dig and assess the site.

Wait'll you read Michael Cremo's *Forbidden Archeology* and find out how much stuff our archeology establishment has been hiding from us. It's reviewed on page 33 of my *Wisdom Guide*.

## Faceless

In thinking back, I don't recall one teacher during my 16 years in school who ever showed the slightest interest in me as a person: I was just another student



to all of them, from kindergarten through college. One more soon forgotten face. Thinking back, the result of this was that I didn't have much of a feeling of personal identity. I was just another kid as far as I knew.

It really wasn't until I got interested in amateur radio that I began to feel that I was different ... that I had something special going for me that the other kids didn't. I particularly enjoyed building hi-fi equipment and ham gear. I spent years at the work bench and loved every minute of it. That's why, when I started 73 in 1960, I did everything I could to encourage readers to get interested in building.

But that was back in the tube days ... in the days of war surplus equipment we could modify for the ham bands. Back before transistors and ICs. We had little tiny VHF tubes and huge transmitting power tubes. We had peanut tubes and acorn tubes. And we had a ball.

We had Poly Paks for cheap parts. We had nearly a thousand ham stores around the country, many with big tables of cheap parts. We had Cardwell, Thordarson, Stancor, Johnson, Millen, Bud, Bliley, and so on making parts.

Old-timers will remember when we builders made fun of "appliance operators." Now we're all appliance operators, only now we need a ten-week course in how to use our appliance rigs ... and a quick brush-up session when we're away from the rig for a coffee break.

Still, even today, we all feel we are different from everyone else. We're ham operators.

## Hot Potato

"Every time we do something you (Shimon Perez) tell me America will do this and will do that. I want to tell you something very clear. Don't worry about American pressure on Israel. We, the Jewish people, control America and the Americans know it." Ariel Sharon, Israeli Prime Minister, Israel Radio, Tel Aviv, October 3, 2001 [http://geocities.com/vialls2/index.html].

Hmm — do Americans really know that, as he said? Or is this just some more E-E-mail disinformation?

## My Advice

With Bush rushing us toward what is hoped to be a warlette with Iraq, I wish he'd asked me for my advice before acting. Yes, I understand about Saddam and his weapons of mass destruction. Heck, I've been writing about that menace for several years.

But how about this approach? In the past the UN sent inspection teams to

investigate potential weapons factories, only to have the Iraqis bar them from inspecting some plants. This time, instead of committing fifty or a hundred thousand troops, how about the inspection teams, when they are refused access to a building, calling in a pin-point air strike to blow the place to smithereens? Along about the second or third time we did this I suspect the UN teams would stop being refused access anywhere.

We could also offer relocation for anyone (and their family) to anywhere in the world they want for information leading us to find a weapons plant we didn't know about.

## Weather Modification

The scientific establishment has a long, unbroken, history of resisting new ideas and developments. I won't go into the all-too-well-known details of Semmelweis trying to get doctors to wash their hands, the invention of the stethoscope, Galileo, the Wright Brothers, and so on. We've seen this arrogance up close recently with cold fusion, and before that with quantum physics.

The scientific community still has the fire brands at hand to burn anyone at the stake who is silly enough to try to investigate pseudo-science, a.k.a., the paranormal. Like ESP, precognition, psychometry, telepathy, near-death experiences, out-of-body experiences, remote viewing, prophecy, and so on. When it comes to researching UFOs, ET experiences, contactees, and crop patterns, they first tar and feather these crazies and then burn them. It makes a brighter, longer lasting fire.

Warm up the tar, guys. Well, I'm a known "crazy." In 1970 when I predicted that our ham repeater systems would one day lead to millions of people using such a service, I got the big heehaw. So I started my *Repeater Journal* and made it happen. In 1975, shortly after the first microcomputer was introduced I predicted in my editorials that they would, in a few years be one of the largest industries in the world. The computer industry giants were the loudest laughers. Those things were just toys. So I started *Byte*.

For those readers with short attention spans, let me remind you of Neil Slade's little exercise in cloud manipulation. I love amazing people with the power of my mighty mind by pointing to a couple clouds and telling 'em that I'm going to make the second one disappear. They naturally laugh at such a ridiculous idea. So I get them in a conversation about something for a couple of minutes, and then ask them to look up. Sure enough, only one cloud is left. Hey, it doesn't

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take any special brainpower to manipulate clouds, anyone can do it.

Okay, so what might happen if a thousand people were to do this all at once? A million?

Well, Art Bell (W6OBB), on his nightly talk show, asked the audience to concentrate on making it rain in Texas at a time when fires were burning all around the state. Within hours Texas was awash in rain, even though the weather bureau had none predicted.

Art repeated this a few days later when Florida was in flames, and the state almost got washed into the ocean. Art, not sure what he was getting into, stopped messing with weather modification.

*Continued on page 61*



## No Good Days — From a Forecast Standpoint

*For many hams this is the prime DXing season, but sharp skills will be needed to cope with conditions this month. Solar activity is forecast to be at moderate to high levels, punctuated by short periods of intense behavior much of the time. There are no Good (G) days marked on the calendar this time, which is a complete reversal of last month's trend. However, positive seasonal influences could tip otherwise marginal days in our favor, so good opportunities may arise when not expected.*

As conditions permit, ten and twelve meters should be very active with strong signals during daylight hours. They will close earlier each day as winter approaches, but fifteen meters should remain open well into the evening. Twenty will be your mainstay, as usual, and should be workable around the clock. Thirty and forty meters will be very good after sunset and are likely to become crowded when conditions are favorable. Eighty meters could be interesting but signals will be weak, so you'll need a good antenna and some transmitter power to be successful.

A review of your old November logs from the last solar cycle might serve as a very good operating template, so dig them out if you haven't discarded them. So far, the sunspot numbers that have been observed this year are quite similar to those plotted for the peak years of Cycle 22 (mid-1989 through late 1992), when the monthly "smoothed" averages remained well above 100. I don't anticipate much of a deviation from the operating conditions we saw ten years ago, so let history be your guide.

Getting to the meat of our forecast, there are four lengthy periods in November that will be mostly Poor (P) or Fair-to-Poor (F-P), especially for those living in northerly climes. Conditions may improve slightly for a few days in between these "clunkers," but it looks as if weak and spotty signals can be expected much of the time. Look for CMEs and strong flaring on the Poor (P) days, especially around the 3rd, 11th, 17th, and 28th, and remember that anytime these events are Earth-directed we may experience geomagnetic storms a day or two afterward.

Putting a positive spin on this, late autumn is a good season for viewing auroral displays during the midnight hours. If you live up north and are in an area without much light pollution, there could

November 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
					1 P	2 P
3 P	4 F-P	5 F	6 F-G	7 F-G	8 F	9 F-P
10 F-P	11 P	12 P	13 F-P	14 F	15 F-G	16 F-P
17 P	18 P	19 F-P	20 F	21 F	22 F-G	23 F-P
24 F	25 F-P	26 F	27 F-P	28 P	29 F-P	30 F-G

EASTERN UNITED STATES TO:																
GMT	00	02	04	06	08	10	12	14	16	18	20	22				
Central America	15 (40)	20 (40)	20 (40)	(40)	(40)	(20-40)	(15) 20	10 (20)	10 (20)	10-17	10 (20)	(10) 20				
South America	(15) 20	20 (40)	20 (40)	20 (40)	x	x	(15-20)	x	(10)	10 (15)	10 (20)	(10) 20				
Western Europe	40	40	40	40	(40)	x	(10-20)	10 (20)	(10) 20	(15-20)	(20)	(20-40)				
Southern Africa	(20-40)	(40)	x	x	x	x	x	(10-12)	10 (17)	(12) 17	(15-20)	20				
Eastern Europe	(40)	(40)	x	x	(20)	x	(10-20)	(10) 20	(20)	x	x	x				
Middle East	(40)	(40)	x	x	x	x	(10)	(10-15)	15 (20)	20	(20)	(20)				
India	x	x	x	x	x	x	x	(15-20)	x	x	x	(20)				
Pakistan	(15) 20	20	(20)	(20)	x	x	(20)	x	x	x	x	(10-20)				
Far East	(15-20)	x	x	x	x	x	x	(10-20)	(10-15)	x	x	x				
Southeast Asia	(15-20)	x	x	x	x	x	x	(10-20)	(10-15)	x	x	x				
Australia	(10-17)	(15-20)	x	x	(20)	(30-40)	(20-40)	(10) 20	(10-20)	x	(20)	(10-15)				
Alaska	15-17	20-30	x	x	x	20-30	20-30	15-17	15-17	x	x	15-17				
Hawaii	(10) 15	(20)	20	(20)	20 (40)	40	(20-40)	(20)	(15-20)	x	(10)	10 (15)				
Western USA	(10) 40	(15) 40	20-40	(20) 40	40	40	40	(20-40)	(10-20)	10-20	10-20	10-20				

CENTRAL UNITED STATES TO:																
GMT	00	02	04	06	08	10	12	14	16	18	20	22				
Central America	(15) 20	20 (40)	(20) 40	(20) 40	(20) 40	40	(40)	(10) 20	10-20	10-15	10 (20)	15-20				
South America	(15) 20	20	20 (40)	20 (40)	(20)	x	x	x	(10)	10	10 (20)	(10) 20				
Western Europe	(40)	40	40	40	(40)	x	x	(20)	(15) 20	(10) 15	10 (20)	(20) x				
Southern Africa	20	(20)	x	x	x	x	x	x	(10-15)	(10) 15	15 (20)	20				
Eastern Europe	x	(40)	x	x	x	x	x	(10) 20	(10-20)	x	x	x				
Middle East	x	(40)	(20)	(20)	x	x	x	(10-15)	(10-15)	(20)	20	(20)				
India	x	(15)	x	x	x	x	(20)	x	(15)	x	x	x				
Pakistan	x	x	(20)	20	(20-40)	(40)	(20)	20	(15-20)	x	15	(15)				
Far East	x	x	(20)	20	(20-40)	(40)	(20)	20	(15-20)	x	15	(15)				
Southeast Asia	x	x	x	x	(20)	(20)	20	(15-20)	(15)	x	(15)	x				
Australia	(10) 15	15	(15-20)	20	20 (40)	20-40	20-40	(20)	x	x	x	(10-15)				
Alaska	15-17	15-17	x	x	x	(40)	(40)	20	20	x	x	x				
Hawaii	(10) 15	(15-20)	20	20	(40)	(20-40)	20 (40)	x	(15)	(15)	(15)	(10) 15				

WESTERN UNITED STATES TO:																
GMT	00	02	04	06	08	10	12	14	16	18	20	22				
Central America	(20-40)	40	40	40	(40)	x	(20)	(10) 20	10 (20)	10 (20)	(10) 20	(15) 20				
South America	17 (40)	(20)	x	x	x	x	x	(15)	12 (20)	10-20	10-20	12 (40)				
Western Europe	x	x	(40)	(20)	(20)	x	(20)	(10-20)	(10) 20	(20)	x	x				
Southern Africa	(20)	x	x	x	x	x	x	x	(10)	(15)	15 (20)	(15) 20				
Eastern Europe	x	x	x	x	x	x	x	x	x	x	x	x				
Middle East	(20)	(40)	(20)	20	20	(20)	x	(15)	(10) 15	(10-15)	(20)	(20)				
India	(15-20)	x	x	x	x	x	(20)	x	x	x	x	x				
Pakistan	(10) 20	(15-20)	x	x	x	(40)	40	x	x	x	x	10-20				
Far East	(10) 20	(15-20)	x	x	x	(40)	40	x	x	x	x	10-20				
Southeast Asia	(15)	(20)	x	x	x	x	x	(20)	(15) 20	(20)	(10-15)	10-15				
Australia	(10-15)	(15-20)	x	x	x	(20-40)	(20-40)	20	(15-20)	15	(10-15)	10				
Alaska	10-15	x	x	20-30	20-30	20-30	20-40	x	20	15	x	15-17				
Hawaii	(15) 20	(15) 20	20	(20)	(40)	40	(20-40)	(15) 20	15 (20)	(10-15)	(10) 15	(10) 15				
Western USA	(10) 40	(15) 40	20-40	(20) 40	40	40	(20-40)	(10-20)	10-20	10-20	10-20	10-20				

Table 1. Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.



be a good show going on overhead whenever the sky is clear and the bands have gone dead. I look forward to major solar disturbances at this time of year and never miss an opportunity to see the awesome "ballet of light" that can be triggered by them, even if it means missing a bit of sleep. You can check on the aurora forecast by going to [http://www.space.com/spacewatch/space\_weather.html#aurora] on the Internet. Another Web site that generates nice aurora forecast maps for your geographic location can be found at [http://www.gi.alaska.edu/aurora\_predict/worldmap4.html].

Have fun, and Happy Thanksgiving!

## Band-by-Band Summary

### 10 and 12 meters

Most of the world should be workable during daylight hours but the window of opportunity is narrowing as days become shorter. As usual, start working to the east just after sunrise and finish in the west about an hour after sunset. The morning and evening gray-lines can yield some interesting contacts, but remember that both you and the station at the other end of the "pipeline" must be in daylight and there isn't a large time window to work with. Daytime short-skip will range from around 1,000 to nearly 2,300 miles.

### 15 and 17 meters

Excellent worldwide openings can be found when propagation conditions are favorable but the strongest paths will lead to stations in the southern hemisphere. Europe can be worked before noon if the aurora doesn't interfere, but most southerly stations will be beyond reach up until after lunchtime. The best signals will come from Central and South America, but openings can be found from Africa to the South Pacific. Short-skip will average from 1,000 to 2,200 miles.

### 20 meters

Good DX will be available at nearly all hours when solar activity isn't too disruptive. Peak periods will fall a couple of hours after sunrise and again in the late afternoon and early evening. Africa, the northern half of South America, and the South Pacific should all be fairly easy to work at this time of year. Also, try long paths across the Antarctic in the morning for activity in Southern Asia and the Near East. Short-skip can range from 500 miles during the day up to 2,100 miles at night.

### 30 and 40 meters

Good worldwide opportunities can be found during the hours of darkness, particularly into the southern hemisphere. Central and South America will have the strongest signals but Southern Europe, the Middle East, and the South Pacific will also provide some good opportunities. Operators on the west coast will probably have trouble with Europe but should hear the South Pacific, Australia, and Indonesia more often than those on the eastern seaboard. Skip distances can be from 750 miles to over 2000 miles at night but are limited to less than 1,000 miles during the day.

### 80 and 160 meters

These bands are now in season with fairly good worldwide DXing available to experienced DXers from sunset through sunrise. Sunspot activity will weaken signals however, so a good antenna and a bit of power will probably be required. Otherwise, stick to stateside phone operations. Expect skip to vary from less than 1,000 miles to over 2,000 miles at night. 75

## NEVER SAY DIE

*continued from page 59*

Hmm, maybe the Indians weren't so crazy with their rain dances.

I do wish that Art had helped put out the Colorado fires by getting his audience to pray for rain there. In light of the Texas and Florida overkill, maybe asking just a few listeners to pray for rain could have done the job. This needs some research.

The next time there's a drought somewhere, instead of cursing God for the blight, maybe try some coordinated prayer to solve the situation.

Once we get the hang of this we'll be able to provide rain when and where it's needed. We'll be able to harness hurricanes and tornadoes. Hey, we have the power, we've just never bothered to learn how to harness and use it. Aspen and other ski areas will be able to get the right amount of snow every night to keep the trails fun to use.

All we have to do is get in better communication with Gaia and our mass consciousness.

If you're interested in reading more about this stuff, get started with Neil Slade, Dean Radin, Rupert Sheldrake, Eugene Maurey, Scott Adams, my *Dowsing* book, Chris Bird, and other authors reviewed in my *Secret Guide to Wisdom*.

The so-called bliss of ignorance is a fools' paradise, and a signal for others to

take advantage of you. Ignorance is for the suckers, so start reading. You could do worse than start with my books.

## Thoughts

(1) We don't lose our health, we throw it away. Hey, what's one cup of coffee hurt? One teaspoon of sugar? Do you recall ever hearing anything about how to keep your body healthy during your years in school? Our media is consumed with sickness, not health. As they say, "Good news does not sell papers."

(2) Both in life and business we're busy every day making decisions and solving problems. Our schools teach neither of these critical skills. Most decisions are minor, but every now and then we're faced with the need to make a decision that could well change our lives. When those times come, will we make our decisions on the basis of bad data, or, even worse, on an emotional response?

Our brains, like computers, come in various strengths and speeds — a good deal dependent on how well nourished they are during the first few years, when most of the potential growth occurs. Nourished, not just with nutrients, but with exercise during critical growth periods.

Alas, virtually no parents have taken advantage of the research that's been reported in baby and childhood brain development — research that explains how any interested parents can increase their child's IQ by 40 to 50 points. I'm talking almost every child a potential Mensa member in the 2% IQ range.

## Quotes

I keep a few inspirational quotes posted around my office.

Like one from Margaret Mead, "Never doubt that a small group of committed individuals can change the world. Indeed, it's the only thing that ever has."

Then there's George Bernard Shaw: "The reasonable man adapts himself to the world, the unreasonable man persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man."

## Prisons

How come John Stossel hasn't done one of his "Give Me A Break" pieces on the American prison situation? I'm, of course, referring to the two million people we have locked up at an average cost, according to a recent news broadcast, of \$60,000 each. Hmm, that's \$120 billion (with a B) out of our pockets every year, a thousand dollars a family, mostly to keep the cost of drugs high on the street. Well, I guess we don't



seriously want to mess with a trillion-dollar industry.

Any congressman who even hinted at legitimizing drugs would first take a big hit in his re-election campaign funding, and then, if he persisted, might find he and his family the target of a more serious hit.

By the time you add up the bribes to police, the feds, customs agents, BATF agents, and other officials, plus payoffs to politicians and bureaucrats at almost every level, plus the cost of running 1,578 prisons, this is quite an industry.

So let's sock away the million street-level jerks who've gotten caught selling the stuff and didn't have enough money to either bribe their way out or get a good enough lawyer to beat the system. Let's put 'em in prison, a.k.a. crime university, so by the time they get out they'll be better educated criminals.

When we finally decriminalized alcohol we ruined business for a million criminals. The big guys did just fine by switching over to importing drugs instead of rum-running.

Let me know when you think it might be time for an education program about alcohol. Oops, that's another trillion dollar industry which mustn't be messed with. We don't want to kill beer sales, or put a million bars and liquor stores out of business, do we? Well, you probably don't, but I do.

### Danger!

Didja read about the CDC research report which says that one out of nine people who receive hospital care is seriously sickened or injured? Look on the bright side, eight out of nine people don't get seriously sickened or injured — only a little sickened or injured. And that doesn't count what the hospital food does to them.

### Okinawa

How come Okinawans have one fourth as many cancers as Americans? The same reason they're living five years longer than we are. Diet. Less sugar and a lot more tofu — more than 10 times as much tofu. We're drinking over ten times as much milk. Oh, have you read Robert Cohen's *Milk, The Deadly Poison*? I've reviewed it in an editorial essay and it's also in my *Secret Guide to Wisdom*.

Hey, if a slow, very painful, hugely expensive cancer death and a shorter life don't worry you, never mind. I'm paying attention because, at 80, I've got at least another twenty years' work laid out. And that's in addition to trying to get the word out on the truth about health to a seemingly deaf, dumb, and blind population.

### College Grads

Okay, you are now "formally educated." But that doesn't mean you've learned much of practical value to your career. Or, have you really had a career in mind? Or have you just been going with the flow?

Your college teachers, with very few exceptions, are people who've never worked in the business world. They've forced you to memorize the same stuff for quizzes that they had to memorize when they went to college. Stuff out of pretty much the same textbooks.

With the job market for grads in the pits these days, just sending out résumés, no matter how creative and exaggerated they are, isn't working.

The free ride on your parents is over. Or, worse, you've gone thousands of dollars in hock to get that degree. Either way, you're now expected to enter the job market and start making money on your own.

It's almost time to start giving some thought to building a career. So, what's it going to be? You're now facing one of the most important choices in your life. One that you postponed four years earlier when you opted for college. Now, you have to make a major choice. Will it be a job? Or back to school for an advanced degree, putting off that career decision again?

If you keep doing this, you'll end up a professor with students short-term-memorizing the same stuff for quizzes that you did.

### Monopoly Mail

Congress didn't do us any favors when it set up the U.S. Postal Service as a monopoly. They made it illegal to compete with it. And what a franchise it has, with the exemption from taxes, zoning laws, and vehicle license requirements. It admits that it has 26,000 offices that are not making money, but any attempt to close them or to downsize their enormous workforce is vigorously fought by Congress.

Many other countries have seen the light, recognizing that socialism doesn't work, and are privatizing their post offices. New Zealand has closed more than a third of their post offices and is privatizing the system. So are Sweden, Finland, Australia, and the Netherlands.

It is illegal for a private company to put anything into a customer's mailbox or through the mail slot in their home. It is illegal to consolidate mail, such as sending bills from several companies in one envelope. Some of our ham radio QSL bureaus have gotten into trouble with the feds because their consolidating of QSL cards is an illegal activity.

Because the Postal Service faces no competition there is little incentive to control costs or maintain quality. It is able to overpay its bureaucracy in salary, benefits, and perks. There is no pressure to minimize waste. The bureaucracy has fought every effort to introduce new technologies to speed up and cut the cost of services. Why, that would put some workers out of work! Thus mail delivery is slow, unreliable, and even lost. I've found that about 2% of the books I mail to customers never arrive! They just disappear. When I mailed silver wire for making silver colloid to nearly 500 customers only about 5% of them ever got it. That bit of postal theft cost me over \$5,000.

A study by the Postal Service found that on routes where private carriers had been contracted, the costs were half those of the Postal Service carriers.

According to the Postal Rate Commissioner, "U.S. Postal workers are the highest paid semiskilled workers in the world." Including overtime and benefits, they're getting an average of over \$45,000 per worker.

A postal audit showed that they damaged half the packages marked "Fragile" that they carried. 94,000 letters were found buried in the back yard of one carrier. Doubleday did a survey and found that 14% of their properly addressed third class mail vanished in the postal system. A Postal Inspection Service audit found properly addressed mail dumped in the trash in 76% of the offices they inspected.

We've gone during my memory from two home deliveries on weekdays and one on Saturday to one on weekdays, and from 2¢ for a letter to 37¢. Now they're planning on ending home deliveries. And yet the service has always lost money, with the shortfall (subsidy) provided by the government — which means that we all are paying for it, one way or another — whether we use it or not.

If you're interested in the skinny on the situation, invest \$13 in the Cato Institute book, *Free the Mail*. Get their free book catalog anyway. 224 2nd Street S.E., Washington DC 20003. If you want a second opinion, then check out *Monopoly Mail* by Douglas Adie, also from Cato.

### How It Works

In a world where almost nothing is as it is made to appear, it should not surprise you to learn that lobbyists are paying off our senators and representatives with cash, trips to "conferences" in prime vacation areas, and so on. And that the same thing is going on in the medical

*Continued on page 64*



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you beskilling the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing out daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2002 expanded edition (160p). \$10 (#04)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been suckered by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Blood Purifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! \$10 (#01)

**Plant Growth Stimulator:** This has the same circuit as the above, all ready to use. Many customers are buying second and third units for their family. Postpaid: \$155 (#PGS).

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat.

What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

**Travel Diaries:** You can travel amazingly inexpensively - once you know the ropes. Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna. Krakow in Poland (and the famous salt mines). Prague, back to Munich, and the first class flight home for two, all for under \$1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. \$5 (#11)

**Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

**Wayne's Caribbean Adventures:** My super budget travel stories - where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out is right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait! If you hear some of Gotschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system - the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. As an iconoclast I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 100 Editorial Essays:** \$5 (#72)

**1997 157 Editorial Essays:** \$8 (#75)

**1998 192 Editorial Essays:** \$10 (#75)

**1999 165 Editorial Essays:** \$8 (#76)

**2000 101 Editorial Essays:** \$5 (#77)

**2001 104 Editorial Essays:** \$5 (#78)

**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Colloid Reprint.** April '97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Clips.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99).

**AC-powered Colloid Kit:** 12V power supply, silver wires, reprint, including priority mail shipment. \$37 (#82)

**Four Small Booklets Combo:** \$3 (#86).

**Super Organic Food:** a trillion dollar new industry; Schools in 2020; another 5 trillion industry. Anthrax, a simple cure. Dowsing: why and how it works.

**My 1992 We The People Declare War! On Our Lousy Government** book-360 pages and packed with ideas that'll get you all excited. Was \$13. While they last \$10. Just a few left, found in the warehouse. Last chance for this classic. (#06)

**Stuff I didn't write, but you need:**

**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs - such as the ice ages, the Earth being a magnet, the Moon causing the tides, and etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$25 (#92)

**1982 General Class License Study Guides.** Teaches the fundamentals of radio & electricity. Was \$7. I found a few in the warehouse. \$3, while they last. Great book! (#83)

## Radio Bookshop

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Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 100,000 active ham potential buyers can see it, rather than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The 73 Flea Market, Barter 'n' Buy, costs you peanuts (almost) — comes to 35 cents a word for individual (noncommercial!) ads and \$1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

**Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the January 2003 classified ad section is November 10, 2002.**

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**METHOD TO LEARN MORSE CODE FAST AND WITHOUT HANGUPS** Johan N3RF. Send \$1.00 & SASE. **SVANHOLM RESEARCH LABORATORIES**, P.O. Box 81, Washington DC 20044 USA. BNB421

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Browse our Web site and check out the "Monthly Special." TDL Technology, Inc. [[www.zianet.com/tldj](http://www.zianet.com/tldj)]. BNB500

**MAHLON LOOMIS, INVENTOR OF RADIO**, by Thomas Appleby (copyright 1967). Second printing available from **JOHAN K.V. SVANHOLM N3RF, SVANHOLM RESEARCH LABORATORIES**, P.O. Box 81, Washington DC 20044. Please send \$25.00 donation with \$5.00 for S&H. BNB420

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**COLD FUSION! - FUEL CELL! - ELECTRIC BI-CYCLE!** Each educational kit: (Basic - \$99.95, Deluxe - \$199.95, Information - \$9.95.) CATALOG - \$5.00. **ELECTRIC AUTOMOBILE BOOK** - \$19.95. **KAYLOR-KIT**, POB 1550ST, Boulder Creek CA 95006-1550. (831) 338-2300. BNB128

**ANTENNA SCIENCE:** Why do antennas radiate electromagnetic waves? Learn for yourself from this enlightening paper by **MAX RESEARCH**. Gain an understanding of the radiation mechanism of antennas! Written in a clear style for radio hobbyists, inquisitive amateurs and experimenters. \$4.95 ... ppd. Order from **MAX RESEARCH**, P.O. Box 1306, East Northport NY 11731. BNB426

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## NEVER SAY DIE

*continued from page 62*

field, where the drug companies are lavishing attention of doctors. I'm talking \$900 dinners at the fanciest of restaurants, two-week trips to exotic places for an hour or so "conference," and so on.

Yes, of course the drug companies keep track of how this influences each doctor's prescription record. Is he pushing more Zoloft or Paxil on his patients?

All of the pressure and "information" have to do with prescribing drugs. That's where the big bucks are. That's where *your* money is going. 73

**Say you saw it in 73!**



# 73 Amateur Radio Today

DECEMBER 2002

ISSUE #505

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Project-of-the-Month:  
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on Dimmers

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Sacrifice Rock  
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# 73 Amateur Radio Today

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**COVER:** This beautiful gold-plated key is the 2002 Christmas Key. Each key has a serial no., and there are only 250 of them. \$60 each from Morse Express (www.MorseX.com/xmas; 303-752-3382). Photo by N1FN.

## QRX . . .

### Bye-Bye Betamax

A legend is being put to rest. After twenty-seven years in production, Sony Corporation says that it will finally put its famed Betamax tape format to bed forever.

It's said that Betamax opened the world of home video as the first practical consumer format. Sony, JVC, and Panasonic first tried with the famed 3/4-inch U-Matic machines, but consumers were reluctant to buy a videotape machine that was bigger than most

TV sets of that era and looked more at home in a television station than their livingroom.

My own first home VCR was a Sony SL-7200 Betamax. It would record a whole hour of pretty-high-quality video and audio on a tape cassette that was only 3-1/2 by 6 inches in size. I paid almost \$2,000 for the machine, and each cassette cost me close to \$25. That was in the late 1970s, and despite losing the 1980s video format war to VHS, Betamax has held on as a niche product all these years.

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article (IBM (ok) or Mac (preferred) formats), carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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## Wise Up & Beat the Odds

### NEVER SAY DIE

Wayne Green W2NSD/1

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#### Director Duty

Maybe you've noticed that we're attracting fewer and fewer new hams, with the fewer particularly concentrated in the youth department. Hey, you read the papers and watch TV — when's the last time you saw an article in a newspaper or magazine, or anything on TV or radio about amateur radio?

If you're a League member there's a remote possibility that you've read the reports in *QST* on the board of directors' meetings. Have you seen any hint of a movement by HQ to get the hobby better known so we can attract more newcomers?

The League directors have a serious decision to make. They have to decide whether they are on the board to represent HQ to the members, or their members to HQ. In the over 60 years that I've been a member, I've seen almost no sign of the directors making an effort to represent the members. They've been kept busy bringing messages from the Newington ivory tower to the unwashed. Indeed, in my talks with many of them, I've been appalled at the contempt they've had for their members. "Sheep," they've called them.

As an entrepreneur who's started a bunch of successful businesses, I know that if you want to sell a product you have to advertise and promote it. This is called marketing. Promotion gives a business the best bang for the buck — when it's done right.

So, with wireless technology

exploding, and with it an increasing demand for more spectrum space, here we are with a declining number of hams, and with only a small percentage really active. I'll bet we don't have 50,000 active hams anymore — less than we had 60 years ago. Experimenting and pioneering today? Tell me about it.

Thirty years ago we developed and pioneered repeaters, bringing the world cell phones. Soon after WWII, Jack Babkes W2GDG developed NBFM for us. A few years later, we pioneered SSB and RTTY, then slow scan. Heady times.

Please explain to your director that he's supposed to represent you and that you want him to get HQ to start promoting the hobby. Tell him you want to start seeing stuff in print and on TV about amateur radio. And if the HQ gang hasn't a clue on how to do it, have 'em give me a call. I'll send them a video I made on how to get plenty of free promotion for any product or service. It's my \$1 Million in Added Sales video. And if he doesn't have the balls to speak up, then find someone who has and elect them. It's time for a serious shakeup in Newington.

Am I "trashing the League"? No way — I'm trashing the League members for being sheep and allowing the only national ham organization to let our hobby slowly die.

I first got involved when I was 14, and the hobby has provided me with a lifetime of excitement and adventure. It sure got me into high tech businesses, and I learned all I

could about electronics because it was so much fun. So I'm anxious for us to get as many kids involved as possible. Unless Planet X wipes us out, America is going to need all of the high tech people it can get. The day of the uneducated blue collar worker is long gone. The day of the semi-literate white collar worker is fading fast. We're in a tech world that's getting techier every minute.

Football and soccer are fun, but sure are lousy career choices for most kids. I'd rather see kids with QRP rigs in their backpack, with a whip sticking up and them making DX contacts as they are going to and from school.

#### Dr. Doom

So what's doin' with Planet X, which Mark Hazelwood predicts will wipe out around 90% of humanity next summer? At this writing the media, en masse, is consumed with the DC area sniper. Well, the looming end of civilization as we know it isn't on their radar yet.

The "Out There" program, which is a radio talk show on TV with Richard and Kate Mucci as co-hosts, did a nice show with Hazelwood. And one with me about the Moon hoax. Then one with remote viewer Ed Dames, a.k.a. Dr. Doom, because of his usual dire predictions. Kate sent me a tape of the Dames show in which Ed agreed that Planet X was on its way and would cause a pole shift which would get rid of our coastal cities and bring us 300 mph

winds in some areas for a week after the shift. His prediction of a 12° pole shift could put the new equator through Cuba, bringing New England Georgia weather in the future. Mmm, love those Vidalia onions.

The idea of such a monumental catastrophe is so preposterous that it has no reality for me. I don't want to believe it.

Now that I've learned how children can easily learn to speak and think in a dozen languages, how their IQs can be raised by around 50 points, how they can easily be taught to speed-read at over 10,000 words per minute, and how we can provide them with an incredible education at a fraction of today's school cost, I feel we're on the brink of a new kind of world civilization — one without wars, where we'll be able to control the weather and where poverty and hunger will no longer be problems. I'd sure hate to see all that blown away.

Is Planet X, if it's real, unstoppable in its regular 3,630-year sweep through our solar system? The one chance I see for changing things would be for earth's entire population to concentrate on praying for it to change its course. The combined prayers of billions of people might be a powerful enough force to do the job.

Meanwhile, let's enjoy the extended sunspot cycle the nearing Planet X may be causing and work that DX.

You can get a tape of the Ed Dames "Out There" TV

Continued on page 8



continued from page 1

Now, according to Larry Bloomfield's Tech Notes news service, Betamax for consumer use is being phased out. This is because of the new consumer digital tape formats like Mini D V that are literally delivering a death blow to Betamax's future prospects.

Sony reportedly will manufacture only 2,000 more Betamax machines before discontinuing the product altogether. But Beta will live on in the world of television journalism. That's where a spinoff tape format called Betacam with suffixes like SX and SP became the de facto news gathering videotape of choice and have remained so for the past decade and a half.

Me? I've got an SL 7200 Betamax still sitting someplace out in the garage — gathering dust.

Thanks to Bill Pasternak WA6ITF, editor, in Newsline.

## North to Alaska ... er, Sorta

The magnetic north pole could soon abandon Canada and migrate to north of Alaska.

The e-newsletter *Science Today* tells of Larry Newitt. Newitt is a researcher with the Geological Survey of Canada. And Newitt says that the magnetic pole is on the move.

The researcher says that the pole, which has steadily drifted for decades, has picked up speed in recent years. He says that at its current speed, it could exit Canadian territory as soon as 2004. And, says Newitt, if the pole follows its present course, it will pass north of Alaska and arrive in Siberia in a half century.

If you are worried that you may soon have to trade in your old compass for a GPS to know where you are, don't. Researcher Newitt cautions that such predictions could be wrong.

Thanks to Newsline, Bill Pasternak WA6ITF, editor.

## Blame It on Him

Phil T. Farnsworth was the inventor of modern-day television. Legend has it that he conceived the idea of making a picture by scanning back and forth, top to bottom, across a screen while tilling a potato field in Idaho at age 13!

In 1927, while a student at Brigham Young University, he transmitted a television image using the scanning method he had conceived years before. The image was produced on an oscilloscope screen by the scanning electron beam within the tube. Sixty horizontal lines were used to make the image. Allegedly a dollar sign was the first image transmitted.

Farnsworth became disenchanted when his invention was used commercially, and told his son, "There's nothing on it worthwhile, and we're

not going to watch it in this household, and I don't want it in your intellectual diet."

Thanks to the *Southeastern Massachusetts Amateur Radio Association, Inc., newsletter, Zero Beat, August 2002.*

## Oops Oops

Thanks to Dave Turner N7QP for pointing out that in Figure 2 of W6WTU's September article, "Mobile Ham Repeater," the 1N4148 diode across the relay coil is shown reversed; as drawn, it is forward-biased. In Figure 3, the diode is shown correctly.

And speaking of W6WTU, we thank him too for 'fessin' up to the fact that he is not the author of November's "Solid State Junk Box Thermometers," as our Table of Contents would have you believe. W6WTU notes that correct author Burl Rogers K4VYL/6 is indeed duly cited on the title page of the article, although "I would have liked to have done the work — he did a nice job!"

Our apologies to all for these oversights.

## One Whale of a SONAR Enterprise

In what sounds like it's right out of a *Star Trek* movie plot, will Captain Kirk and Mr. Spock have to go rescue some whales from oblivion after all? And what does this have to do with radio communications?

In the movie *Star Trek: The Voyage Home*, the crew of the starship *Enterprise* — without the *Enterprise* — takes on the job of saving our planet from annihilation by a space probe. The probe is angry because it is programmed to contact humpback whales, but it cannot find any because all the whales are long gone from the planet. To save the world, Kirk and crew travel back in time to get some whales and bring them into the future.

With that in mind, picture this: The Administration has now given the Navy permission to begin using a powerful new low-frequency SONAR to identify enemy submarines.

SONAR, which stands for Sound Navigation and Ranging, is usually used to observe objects in water to determine distance. According to the Navy, each of the new SONAR's 18 transducers produces an audio signal equivalent to the noise level you would hear if you stood next to an F-15 fighter jet while it was taking off. It is this high power that makes it possible for the sound waves to travel several hundred miles and return an accurate target echo.

But environmentalists are worried. They note that the new SONAR system operates in the same band of frequencies used for communication by many large whales, including humpbacks. They say that whales are particularly susceptible to SONAR interference because they rely on sound for communication, feeding, mating, and

migration. In fact, they navigate the oceans of the world using a kind of natural SONAR of their own.

Some scientists believe that whales will mistake the Navy SONAR signals for other whale pods and swim in the wrong direction. And they believe that if this happens, the world's whale population will decrease. Others disagree. This group of researchers believes that the two can co-exist with careful monitoring of the whales for any adverse effects which might be noticed. Adjustments could then be made to the SONAR system's operation to minimize or eliminate any problems.

The bottom line is that it's a tradeoff in communications — that of the whales versus the need of the public to be safe from enemy attack.

The National Marine Fisheries Service says that with proper monitoring and safeguards, the Navy's new SONAR is not likely to injure whales or any other marine mammals. But to be on the safe side, we hope that Captain Kirk, Mr. Spock, and Scotty are standing by.

Thanks to Henry Feinberg K2SSQ, via Newsline, Bill Pasternak WA6ITF, editor.

## Techno-Junk Piling Up

A new study called "Waste in the Wireless World: The Challenge of Cell Phones" says that 130 million wireless devices will be discarded annually in the United States. This equals 65,000 tons of two-way radio garbage.

The study makes several recommendations regarding both the design of cell phones and the disposal of them. It says that the use of toxic substances in them should be reduced. It also suggests that device standardization be implemented so that users are not forced to purchase new phones when they change service providers or for travel. Finally, the study says that cellular telephones should be designed for disassembly, reuse, and recycling.

It should be noted that the study was limited to cellular phones and other two-way radio devices. It does not include the tons of VCRs and TV sets that are disposed of each year.

Thanks to Newsline, Bill Pasternak WA6ITF, editor, and its listeners.

## X-Ray Eyes

If you thought only cartoon superheroes like Superman could see through walls to detect the villains, guess again. New technology called ultra-wideband will soon allow mere mortals to detect objects buried underground and to build cars enhanced with sensors that help avoid collisions.

According to press reports, ultra-wideband uses millions of narrow pulses each second to get an accurate reading of location and distance,



opening the door for new applications in radar tracking, precise positioning, and wireless communications. The possibilities vary from short-range computer networking for homes to devices that determine the location of golfers on a course.

What regulators like even better is that ultra-wideband devices can work within frequencies already allocated for other radio services — helping to maximize this dwindling resource. The Federal Communications Commission believes the technology is so promising that the agency has proposed allowing it to be used on an unlicensed basis.

But it may be a while before the new technology is available. First, government agencies and private groups are testing to make sure ultra-wideband can safely coexist with other services, like the Global Positioning System. More information is on the ultra-wideband working group Web site at [www.uwb.org].

*Thanks to Science Today, via Newsline, Bill Pasternak WA6ITF, editor.*

## Do You Know Who You Are?

Since the 9/11 disasters, lawmakers and business leaders have been clamoring for a better ID system for everyone. ID cards that contain specific biometric data, making them harder to forge than your driver's license, may be in our future. Privacy advocates are in strong opposition to this, but Congress and businesses are looking real hard at it. Besides your photograph, which will probably be laser-engraved, they would contain such vital statistics as your social security number, date of birth, name, and an ID number issued by the government. It would most likely contain an optical memory strip, which could only be read by an optical scanner; it could contain your fingerprint as well as an eyeprint (iris). It could contain smart card technology with the addition of an integrated microprocessor. An internal memory strip could be rewriteable, and could contain many megabytes of data — as much as would fit on a dozen floppy disks. These could contain health records such as heart rate, face scans, fingerprints, DNA sequences, and much more health and body data that can be compared. It could even contain a 2-D bar code. So you think the government doesn't know who you are? This is almost a surety for the near future, especially if the U.S. suffers another terrorist attack.

*Thanks to The Modulator, the News and Views of the Fort Myers (FL) ARC, Inc., August 2002.*

## A. Prose Walker W4BW — SK

A. Prose Walker W4BW, the man considered as the father of the "WARC bands," has died. Walker headed up the FCC's old Amateur and Citizens Division from 1971 to 1975. While there, he made the initial proposal for the creation of

the 10, 18, and 24 MHz bands at a conference in Geneva in 1972. Later, Walker organized and chaired the United States Advisory Committee of Amateur Radio. This committee took the initial steps to turn the idea into reality at the 1979 World Administrative Radio Conference.

But there was another side of Walker that hams in the world above 50 MHz do not remember very fondly. It was a set of highly restrictive repeater regulations promoted by Walker back in the early '70s. Among other things, these rules required the submission of what are today called engineering feasibility studies in order

to get a required WR prefix repeater license. The regulations were so strict that repeater growth almost ground to a halt for the better part of half a decade. Eventually, the ham community, led by 73 Magazine publisher Wayne Green W2NSD, rebelled against the Walker-inspired rules. They were repealed as a part of repeater deregulation a few years later.

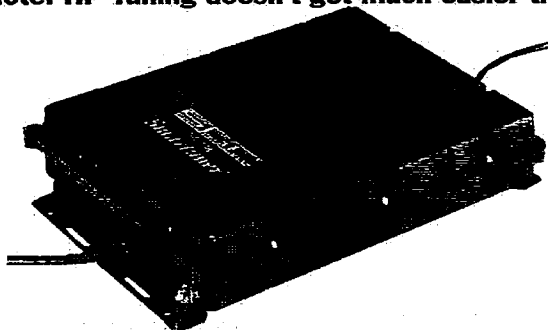
Walker was living in Rochester NY at the time of his death. He was 92.

*Thanks to the ARRL, Repeater Remailer, and W9JUV, via Newsline, Bill Pasternak WA6ITF, editor.*

73

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## NEVER SAY DIE

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show for \$20 + \$3 s/h by calling 775-751-2379. Tell Kate Wayne sent you.

Oh, one more item. I understand that an astronomer, concerned enough over the Planet X situation to take the trouble and expense, went to Australia so he could look through a telescope there for the incoming brown dwarf. He called home, saying he had some spectacular pictures. Then someone killed him and the pictures have disappeared. He's coming back in a box.

### Tolja

The August issue of the *European Journal of Cancer Prevention* published an article on the Swedish research which showed that cell phone users had a much higher rate of brain tumors than average ... and the more they used them, the higher the rate.

A Finnish study showed that one hour of cell phone use measurably affected brain cells.

The American cell phone industry is, of course, disinterested in any research, or in reading the published work of Ross Adey K6UI, the world's leading researcher in this field. But, if you watch what these guys do, you'll see 'em using a headset wire to their cell phones.

We may soon see a headline-making trial as brain-cancer stricken neurologist Christopher Newman sues the cell phone industry. He's represented by the Peter Angelos firm, which has gotten huge fees from its actions against asbestos and cigarette firms.

With over a billion people now using cell phones worldwide, this may be the biggest biological experiment in history.

It's something to think about the next time you pick up a cell phone or an HT. And we hams are the ones who developed cell phone technology for the world some thirty years ago.

### The Secret

The fact that any illness

can be cured without drugs is something doctors never hear about in their years in medical school. And since it would put them out of business in short order, it's something they don't want to hear about. It's their worst nightmare. There's just Dr. Lorraine Day in San Francisco, Dr. Bruno Comby in Paris, and Wayne Green up in New Hampshire preaching to empty pews.

Instead of people griping about the cost of prescription drugs, I recommend their spending a tiny fraction of their drug cost on educating themselves so they won't need to waste all that money.

### More Mercury

The medical industry is becoming more and more aware of the dangers mercury has for us. When I was a kid it was something we played with. We'd coat dimes with it to make them shine. No big deal.

Wrongo. Again.

It turns out that one lousy gram of mercury can contaminate a 20-acre lake for up to a year! So now there's a growing concern about capturing the mercury residue dental patients spit out when they're told to rinse. This goes down the drain into the sewage system, polluting the environment for years.

So what's the big deal? 98% of multiple-sclerosis patients have mercury poisoning. Mercury is a deadly poison which seriously impairs brain function.

So, what about all that mercury you are not spitting out when the dentist asks you to rinse? That stays in your amalgam filling — for a while. It gradually is released as mercury vapor and goes into your body ... and your brain.

Well, I've written about that before, and it's covered in my *Secret Guide to Health*. If you still have amalgam fillings, get 'em replaced with plastic.

Meanwhile, as the concern over mercury pollution grows, they're working to remove all of the mercury switches from old cars before they are melted down, and the EPA

got on the case of the sneaker company that put mercury switches in their shoes to switch on lights in their shoes when kids were running. The mercury in thermometers has been replaced with some sort of less toxic red stuff.

### Americans

A recent PBS series on Australia almost got me thinking. Close call.

One of the big concerns in Australia has to do with recent immigrants, who arrive complete with their homeland languages, customs, religions, and ways of dressing, and then tend to live in enclaves to help perpetuate their heritages. The older Australians view is that if they come to Australia they bloody well should become Australians. They should speak the Australian language, adopt the Australian customs, and integrate with the Australians rather than live in separate ethnic groups.

We have this same situation here in America, and I've seen it played out in one country after another.

When the Europeans arrived in Africa they found it peopled with almost stone-age-ignorant savages, so they had no trouble taking over the whole continent. The natives were no problem, it was just the other European countries that they had to deal with. Germany grabbed big chunks, as did France, Belgium, Spain, Portugal, and the Dutch.

In East and South Africa, the British got busy exploiting their territories. In South Africa, it was gold and diamonds. In East Africa, it was growing crops such as coffee. But all this business activity required workers, and no way had been discovered to get the native blacks to work ... so they brought in Indians to build the roads and railroads, and to work on the farms.

With Africa being tropical, the living was easy. The black way of life was to live in small mud-hut villages, with the women doing all the work ... growing the crops, bringing up the children ... and the men hunting and killing their

neighboring tribes. This had been going on for thousands of generations, so it wasn't going to be easy to change. The whole concept of work was totally alien to the men. That was for women! And any man who worked was ridiculed and humiliated by the others for being woman-like. Sissies.

Education? The only purpose of education was to fit a man to work, so just as many American blacks humiliate others who try to learn to speak American as trying to become white, the African black men avoided education. And that made them sitting ducks for the invading Europeans.

The slave trade developed when the black men discovered that there was money to be made by selling instead of killing the prisoners when they raided a neighboring village.

The Indians who were brought in to do the work settled into enclaves, where they avoided almost all contact with either the whites or the blacks. They opened stores and, by cooperating with each other, easily drove any competing black or white-owned stores out of business.

I saw this same pattern in Kenya, Uganda, and Tanzania, when I first visited the area 35 years ago. This was shortly after colonialism had been replaced by black rule.

It didn't take long for the black hatred of the Indians to result in their being forced by the new black leaders to leave the East African countries, and that led to the disintegration of the cities and towns as things went back to the bush. The white farmers were also forced to leave and their farms also went back to the bush. With little to export, these countries skidded into poverty.

Here in America we've seen similar situations where immigrant groups who live in enclaves and avoid assimilation are hated.

When I visited Fiji the island was on the verge of a revolution. The Fijians were furious with the Indians, who

Continued on page 39



# Commercial-Quality Function Generator

*How about this addition to the bench?*

*How many times have you needed a function generator to provide a source of sine or square waves to test your ham equipment or a new circuit idea? More than a couple, at least if you are anything like most experimenters. A good, high-quality, dual-tone sine wave generator is a really needed item also, if you need to check out your SSB transmitter and linear amplifier performance.*

Well, here is such an instrument that does those jobs nicely, with the added feature of a frequency counter that is also a nice extra to have. So let us take a look at what is required.

First, we must understand what I was interested in when doing the design phase. The absolute number one

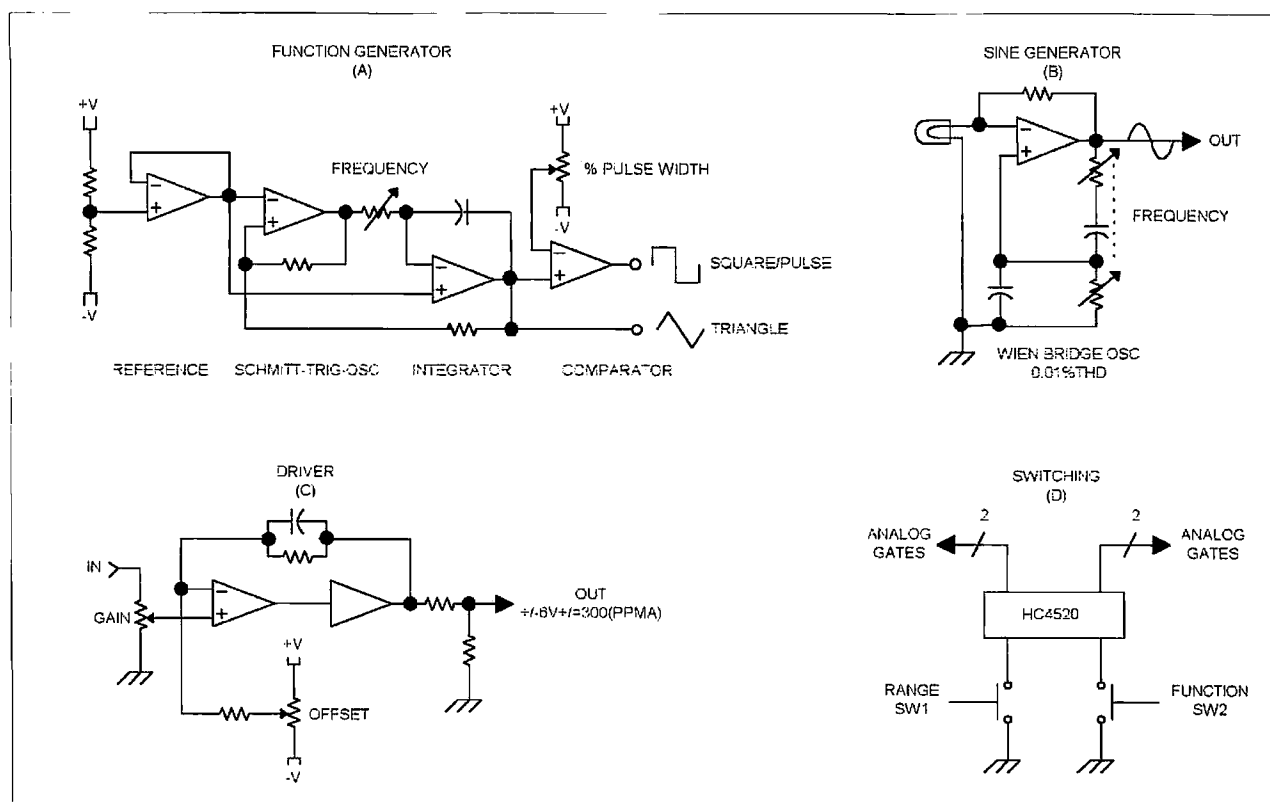


Fig. 1. Simplified schematics.



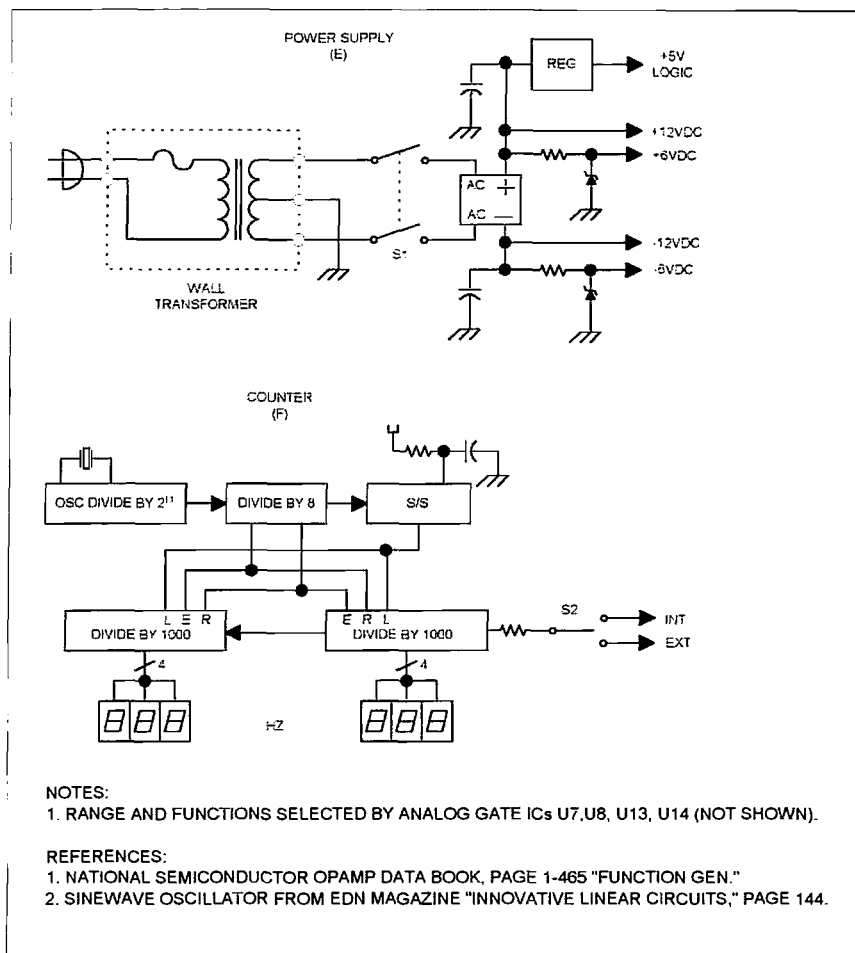


Fig. 1. Simplified schematics (continued).

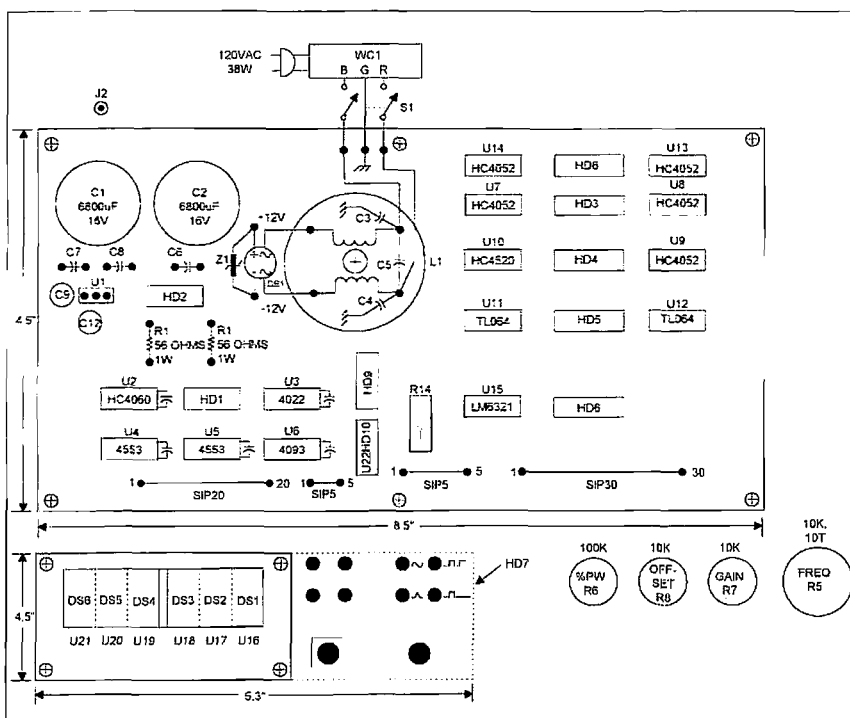
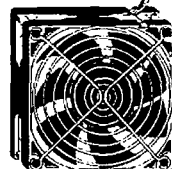


Fig. 2. Component locations.

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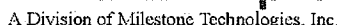
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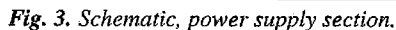
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1	*WC	15VAC-1,8A (CT) Wall Xfmr (Hosfelt 56-781)	2.95
1	U1	LM2940CT-5 5V-1A Reg IC (Jameco-107182)	1.29
1	U2	HC4060 CMOS IC DIP (Mouser-511-M74HC4060)	.64
1	U3	4022 CMOS IC DIP (Mouser-511-4022)	.66
2	U4,U5	4553 CMOS IC DIP (Jameco-13709)	5.90
1	U6	4093 CMOS IC DIP (Jameco-14300)	.29
5	U7-9,13,14	HC4052 CMOS IC DIP (Mouser-511-M74HC4052)	4.20
1	U10	HC4520 CMOS IC DIP (Mouser-511-M74HC4520)	.62
3	U11,12,22	TL064ACN Quad OPamp IC (Mouser-511-TL064ACN)	3.00
1	U15	LM6321 Linear IC (Digi-Key LM6321N)	5.28
6	U16-U21	HP-5082-7300 7Seg IC (Jameco-173833)	29.70
1	B21	Bezel-- 3,5"--Black (DigiKey-PRD250B)	2.00
1	B22	Bezel-- 3,5"--Red Lens (DigiKey-PRD250R)	1.60
1	B23	Bezel-- 3,5"--Clear Lens (DigiKey-PRD250W1)	1.60
3	J1,J3,J4	Jack SMA Bulkhead Fem Coax (Jameco-153285)	7.50
1	J2	Jack (Test Point) (Any)	.25
1	Q1	PN2222 NPN Tran (Jameco-178511)	.16
1	Q2	PN2907 PNP Tran (Jameco-178520)	.16
1	DB1	200V-1,5A Diode Bridge (Mouser-625-W) 2G)	.35
2	D1,D2	1N5232B Zener Diodes (Jameco-179055)	.14
2	D3,D4	DELETE	---
4	D5-D8	T-1 (3mm) Green LED (Jameco-34606)	.60
4	D9-D12	T-1 (3mm) Red LED (Jameco-94529)	.76
8	BZ4-11	3mm LED Bezels (LH-100) (Jameco-95513)	.96
1	PCB	Perf PC Board 4.5x17" (Mouser-574-16944)	10.59
3	B1,2,3	#1240 Lamp TL Wire Leads (Hosfelt-25-290)	1.05
1	X1	32768 HZ Watch Crystal TF2 (DigiKey X801)	.30
8	---	DIP16 WW (Mach Pin) Socket (Hosfelt-21-174)	4.00
9	---	DIP18 WW (Mach Pin) Socket (Hosfelt-21-180)	4.50
2	---	DIP24(W) WW (MachP) Socket (Hosfelt-21-184)	.70
8	---	DIP24(S) WW (MachP) Socket (Hosfelt-21-183)	2.80
2	SIP-1,2	SIP40 WW Header (Jameco-160881)	.80
1	---	Decal Kit (Radio Shack) (RS-270-201)	3.00
2	C1,C2	6800MF-16V-Elect-Cap (18x36) (Jameco-31510)	2.18
4	C3,4,21,22	0,01MF-50V-Mono-Cap (Mouser-21RX410)	.44
1	C9	100MF-35V Elect Cap (8X11) (Jameco-93551)	.19
2	C10-C11	100MF-16V Elect Cap (6x5) (Jameco-94431)	.18
1	C12	220MF-10V Elect Cap (Digikey 140-MLRL10V220)	.17
6	C13-C17	0,1MF-50V Mono Cap (Mouser-21RZ310)	.48
21	C5-C8	0,1MF-50V Mono Cap (Mouser-21RZ310)	1.72
2	C23-C37,C50,C52	---	---
2	C19	100PF-50V-NPO-Mono Cap (Mouser-21RD610)	.10
2	C20,C51	10PF-50V-NPO-Mono Cap (Mouser-21KD710)	.20
4	C38-C41	0,002MF-50V-5%-Styrene Cap (Mouser-23PW220)	.96
2	C42,C46	0,001MF-50V-5%-Styrene Cap (Mouser-23PW210)	.22
1	C18	0,1MF-50V-Mono Cap (Axial) (Hosfelt-15-407)	.08
2	C43,C47	0,01MF-50V-5%-Styrene Cap (Mouser-23PW310)	.38
2	C44,C48	0,22MF-50V-Elect. Cap (Mouser-140-L50V,22)	.09
2	C45,C49	4,7MF-16V-Elect Cap (Mouser-140-L16V4,7)	.09
1	L1	Dual 8,2MH Choke (PS96180) (Hosfelt-18-129)	.35
1	Z1	11VAC/18VAC Clamp MOV (Jameco-190449)	.25
1	R1,R2	56-5%-1W-MOF-Resistors (Mouser-281-56)	.38
2	R3,R4	220-5%-0,25W-CF-Res (Jameco-30470)	.10
1	**R5A,R5B	10K-10T-Dual POT (Bourns#84A2DE28J15/J15)	---
1	Alternate	10K-1T-Dual POT (Mouser-31VW401)	2.10
1	Optional	15:1 Mechanical Dial (Mouser-5940-16111)	12.00
1	R6	100K-1T-POT (Mouser-31CN501)	1.02
2	R7,R8	10K-1T-POT (Mouser-31CN401)	2.04
2	R9,R27	22K-5%-0,25W-CF-Res (Jameco-30453)	.10
1	R14	10K-15T-T-POT (Bourns-3006) (Hosfelt-380135)	.85
1	R10	15M-20%-0,25W-CF-Res (Mouser-291-15M)	.10
3	R15,R16	1K-5%-0,25W-CF-Res (Jameco-29663)	.15
0	R20,R22	---	---
2	R18,R19	47K-5%-0,25W-CF-Res (Jameco-31149)	.10
1	R12	2200-5%-0,25W-CF-Res (Jameco-30314)	.05
3	R13,32,33	150-5%-0,25W-CF-Res (Jameco-30162)	.15
3	R17,24,25	330-5%-0,25W-CF-Res (Jameco-30867)	.15
1	R21	33-5%-1W-MOF-Res (DigiKey-P33W-2BK)	.30
3	R22,23,26	10K-5%-0,25W-CF-Res (Jameco-29911)	.15
2	R28,R31	56K-5%-0,25W-CF-Res (Mouser-291-56K)	.10
3	R11,29,30	100K-5%-0,25W-CF-Res (Jameco-29997)	.15
2	R35,R36	1200-5%-0,25W-CF-Res (Jameco-29735)	.10
1	R35	1800-5%-0,25W-CF-Res (Jameco-Bulk)	.05
1	R37	560-5%-0,25W-CF-Res (Jameco-31376)	.05
0	R38	DELETE	---
8	R39-R46	CAL Res 5%-0,25W,CF-Res (Any)	.40
1	---	Knob-0,25" Black (Large) (Jameco-138481)	1.25
3	---	Knob-0,25" Black (Small) (Jameco-162499)	3.75
1	RN*	100Kx8-2%-DIP16-RNET (Jameco-108644)	.60
2	SW1,2	PB Switches (KRS-1273-B) (Jameco-155379)	.80
2	SW1,2	PB Caps (KRS-CAP-B) (Jameco-155408)	.30
1	S1	DEPT (2-Pos) SubMini Toggle (Jameco-75977)	1.29
1	S2	SPDT (2-Pos) SubMini Toggle (Jameco-75969)	1.15
1	S3	SPDT (3-Pos) SubMini Toggle (Jameco-72557)	1.15
1	---	0,25" Rubber Gromet (Any)	.10
8	---	0,25" Nylon Standoffs #4 screws (Hosfelt)	---
APPROX. TOTAL: \$ 132.00			
NOTE:			
(1) ACE Hardware #1003979 Almond Spray Paint (15oz) \$3.00			
(2) Minwax Polyurethane #33050 Clear Gloss Spray (11oz) \$4.00			
(3) * WC is GroupWest #57A-15-1800CT (38W) Wall Transformer.			
(4)** Author used Bourns 10turn pot because it was available			
Tests show Mouser part is O.K. (Optional) 15:1 Dial.			
(5) Out/In=6FT Coax with male SMA's (Jameco-159450) \$5.75.			

Table 1. Bill of materials.

high-quality, dot matrix hybrid types which are very compact and high-contrast. They are small enough that three digits can be handled by a standard DIP24 socket. I use the least significant digit's decimal point to show the

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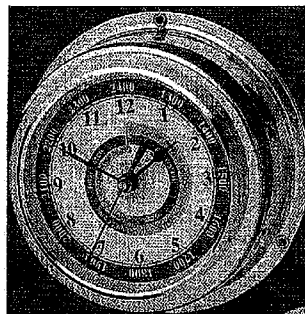
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the 1% specified (THD) was desired. So a voltage reference, Schmitt trigger, integrator, and comparator circuit was designed using a quad JFET op amp IC, TL064A. The circuit also uses a couple of analog gate ICs to do the resistor and capacitor selections. The timing resistor and capacitors are the same ones that are used in the Wien bridge sine wave oscillator. Two additional analog gate ICs were also used to select the LED indicators for range and function. These gates are selected digitally with push-button switches to a dual binary counter IC, U-10.

The multiwave output is then sent out to the gain and offset controls so that amplitude and position relative to ground can be adjusted by the user. The frequency is controlled by the ten-turn dual 10k-ohm pot, R5. The output of the generator is run through a special current mode driver IC. This IC provides 200 mA of continuous drive and is short-circuit and thermal protected. Quite a bargain at under six dollars and in a DIP-8 package!

The power supply circuit was my next concern. The use of a wall converter is most desired so as to keep the high voltage AC out of the enclosure. These wall converters or transformers are UL and CSA approved for safety and are very inexpensive. Ours brings a 15 volt centertapped winding to the PC board and is rated at 1.8 amps. This AC voltage is put through a bridge rectifier to get our POS and NEG 12 VDC at over 1 amp. Note that at 1.8A the voltage would be about 8 VCT, but since we have a maximum of 12 VDC @ 200 mA requirement, we do not level. The two shunt regulator circuits draw another 200 mA to achieve the POS and NEG 6 VDC power for the

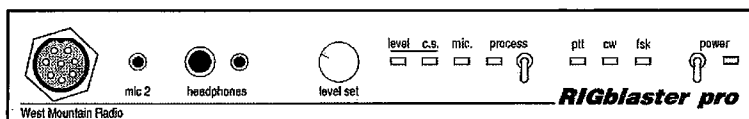
Continued on page 16

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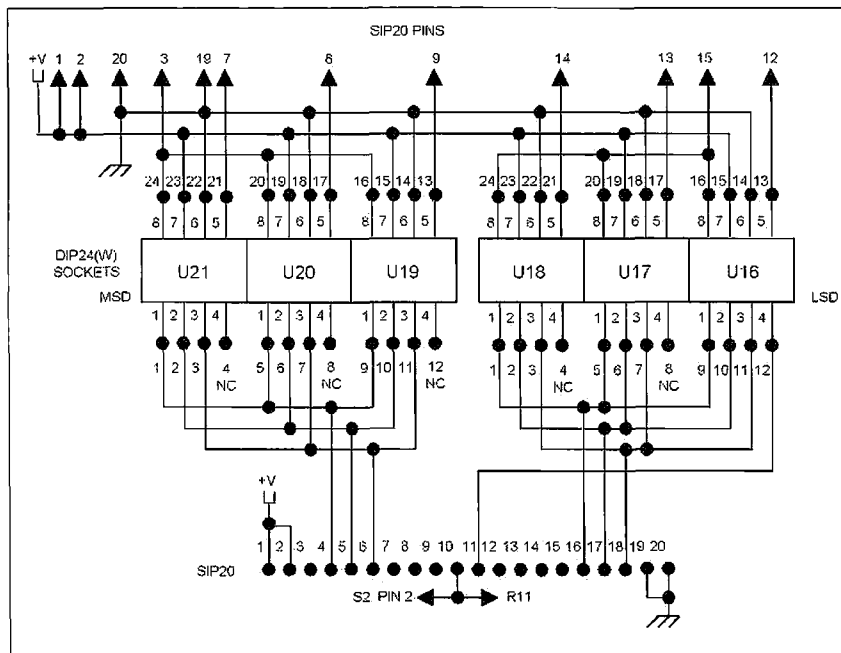


Fig. 5. Schematic, counter display section.

## Commercial-Quality Function Generator

*continued from page 15*

op amps and CMOS logic components.

Now, the digital logic TTL display hybrids which draw about 100 mA each will need that high-current 5V source. I took the +12VDC line and put the U-1 series voltage regulator IC on it for the 5VDC 600 mA requirement. The regulator IC LM-2940-5 is a low dropout type which can work down to the one half volt differential point, so no problems in our application. The 5 VDC 600 mA display requirement does

not throw our bridge rectifier circuit out of balance. The regulator is rated for 1 amp, so 600 mA does not exceed its specification, but do expect a little heat on the TO-220 package running at about four watts. No heat sink is required!

Some folks may ask why the shunt 6V regulators instead of the series ICs? Well, we find that transients, noise and such, will not get through as sometimes happens with series regulators. The use of a dual 8 mH choke L-1 is to eliminate the common mode parts of that power line stuff!

Now, we look at how to put it together. No etched and drilled PC board

is available to my knowledge. There does not seem to be an interest in that for this project. I chose to use wire-wrap technology, as always, with this project. The use of machine pin-type wire-wrap sockets to accommodate both ICs and passive components works very well. I also use SIP (single-in-line) wire-wrap binding posts for the termination of wires. These wires go between boards, controls, switches, and the like.

I chose my usual Ten-Tec enclosure and PMI plastic display bezel so that we can get a good professional looking instrument. All of the connectors, switches, and test lines are the sub-mini types. They look and work good, and the cost is very reasonable.

I added an additional two Wien bridge oscillators to provide an SSB test circuit. This is a 700 and 1900 Hz dual tone source. When you put the signals into the microphone jack of an SSB transmitter, you will have the required envelope test to check the rig and linear amplifier for linear operation.

I provided simplified schematic functions in Fig. 1. All of the component placements are also shown in Fig. 2. All of the header details are in Fig. 3. I provided a bill of materials (Table 1), the approximate cost, and the sources I found for them. A template is also provided as a guideline for the metalwork necessary on the JW-10 Ten-Tec enclosure. I recommend that a nice coat of enamel spray paint be used after the metal work. The decals make things

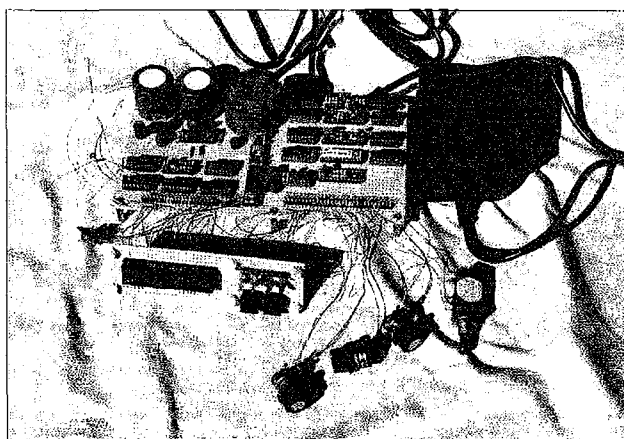


Photo B. Photo of components on PC board using wire-wrap technology.

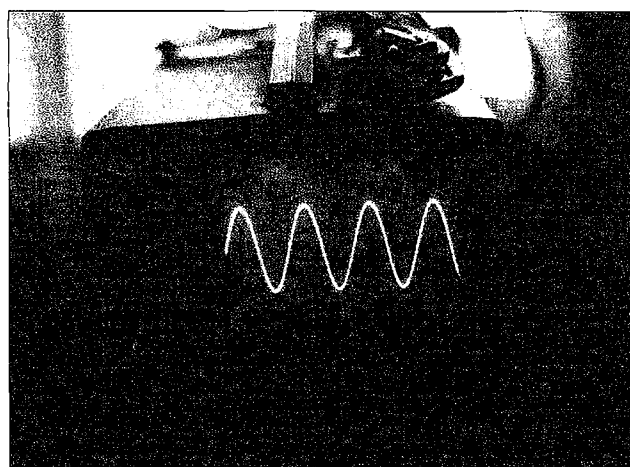


Photo C. Sine wave.



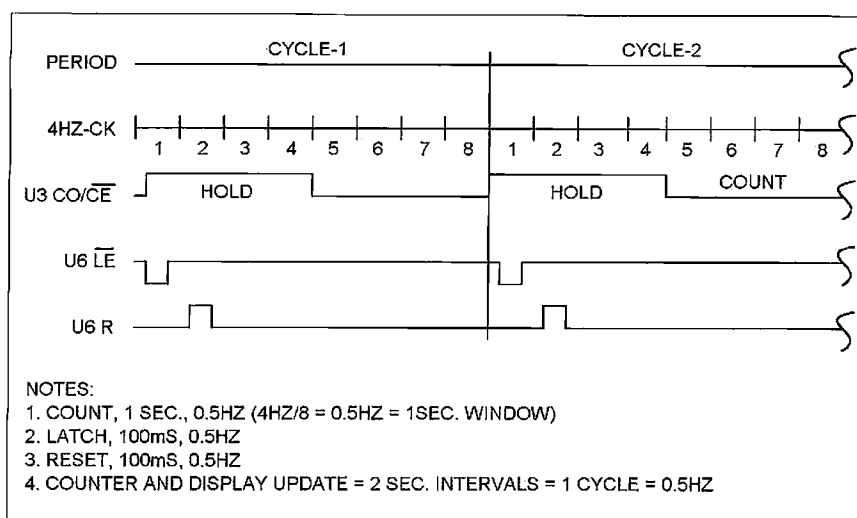


Fig. 6. Timing diagram counter section.

look very professional and can be found at your local Radio Shack or office supply stores. A couple of very

light coats of polyurethane gloss will

Continued on page 18

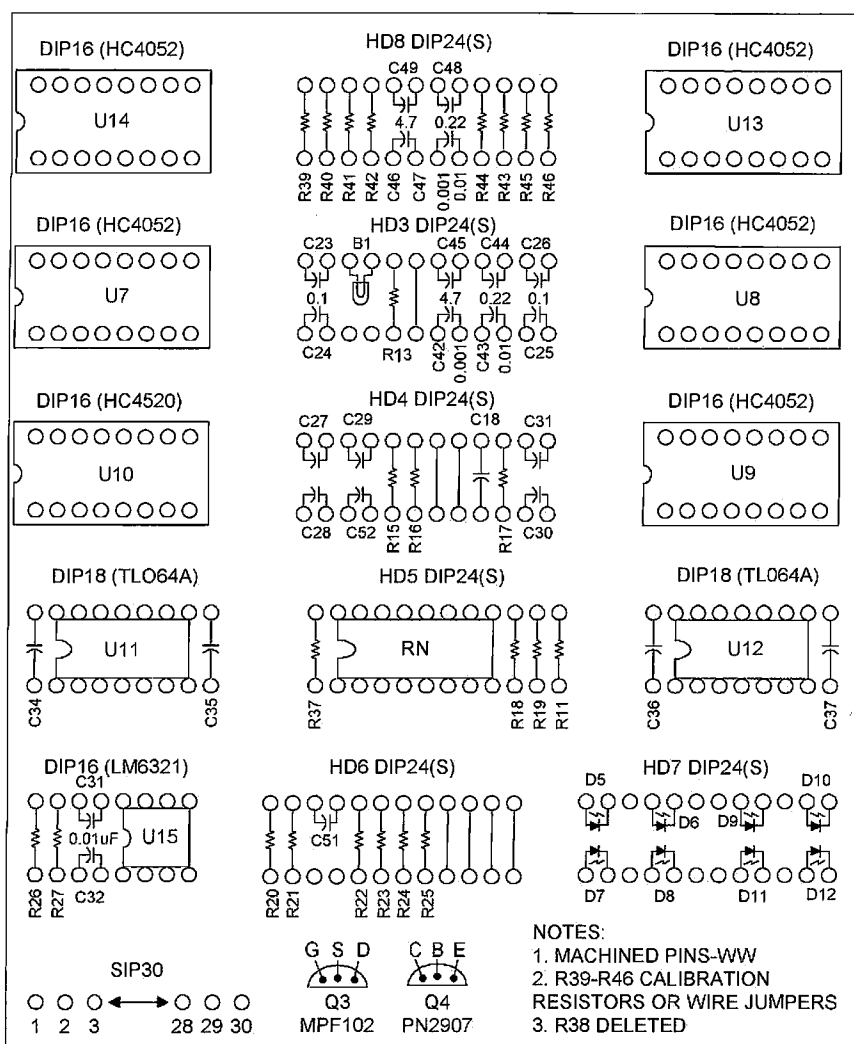


Fig. 7. Header component outline.

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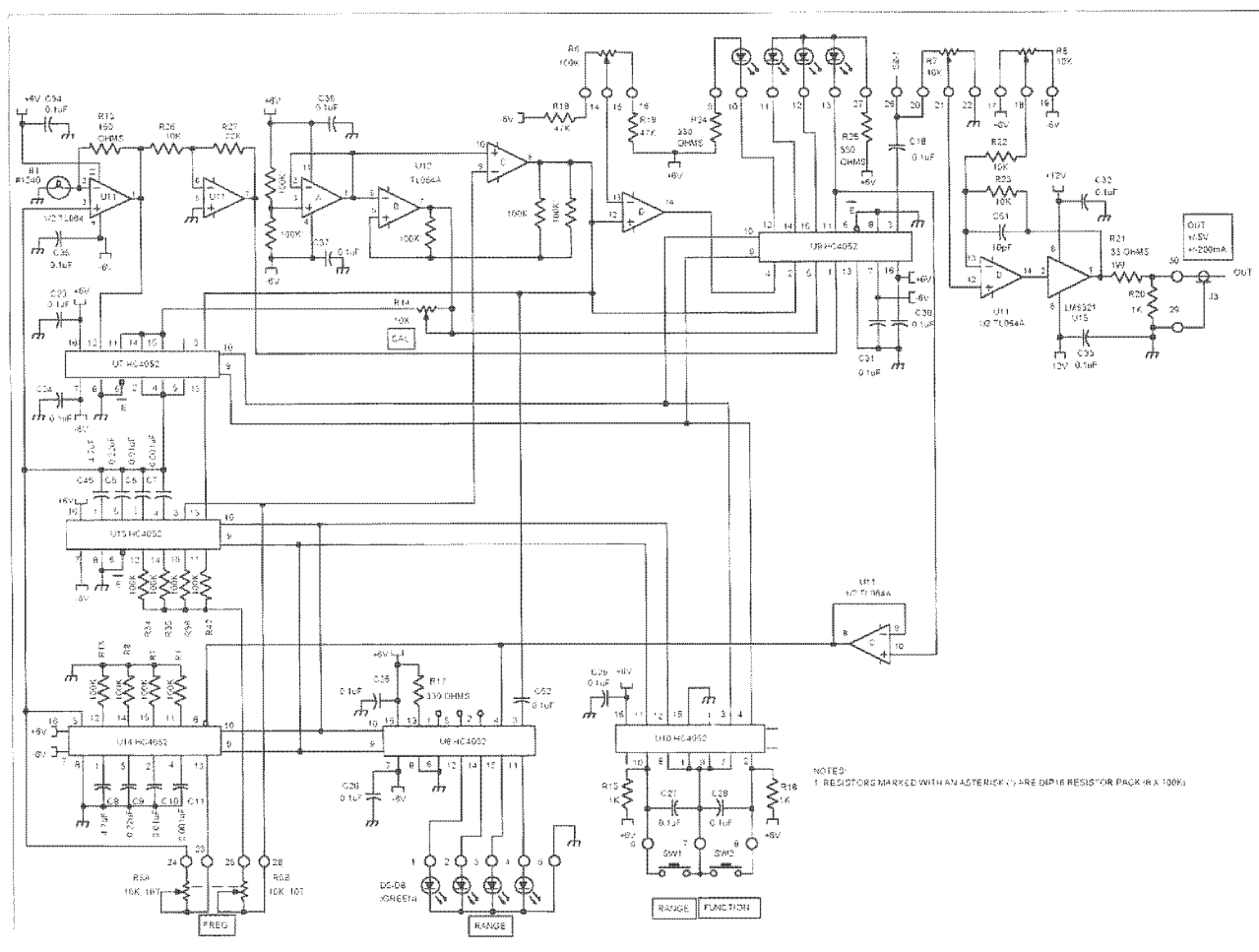


Fig. 8. Schematic, function generator section.

## Commercial-Quality Function Generator

*continued from page 17*

make it pretty and quite durable, and is definitely well worth the effort.

I have included a couple of photo-

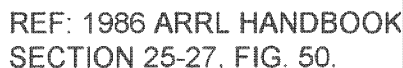
graphs to show the extremely low distortion of the wave forms. Note that the fourth range position is for the sine wave only. The triangle (sweep wave), square, and pulse are not usually needed above about 20 kHz. The range can be used, but will have distortion especially on the triangle wave. A note of caution regarding the B1,2,3 #1240 incandescent lamps is that they should not be substituted with any other type if the 0.01% THD is to be expected. This type is the best I found to produce low distortion Wien bridge oscillator sine waves. This 0.01% THD was verified on a laboratory distortion analyzer. Only the zero crossover produced a slight distortion, but still it was below the 0.01% if the TL064A quad op amp IC was used.

I also included an optional time base crystal oscillator output via a jack on the back of the enclosure. The counter probe, in the external position, can be



Photo D. Triangle wave.





(B)

I need to make mention of resistors R28 through R36, which are used to

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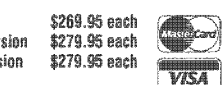
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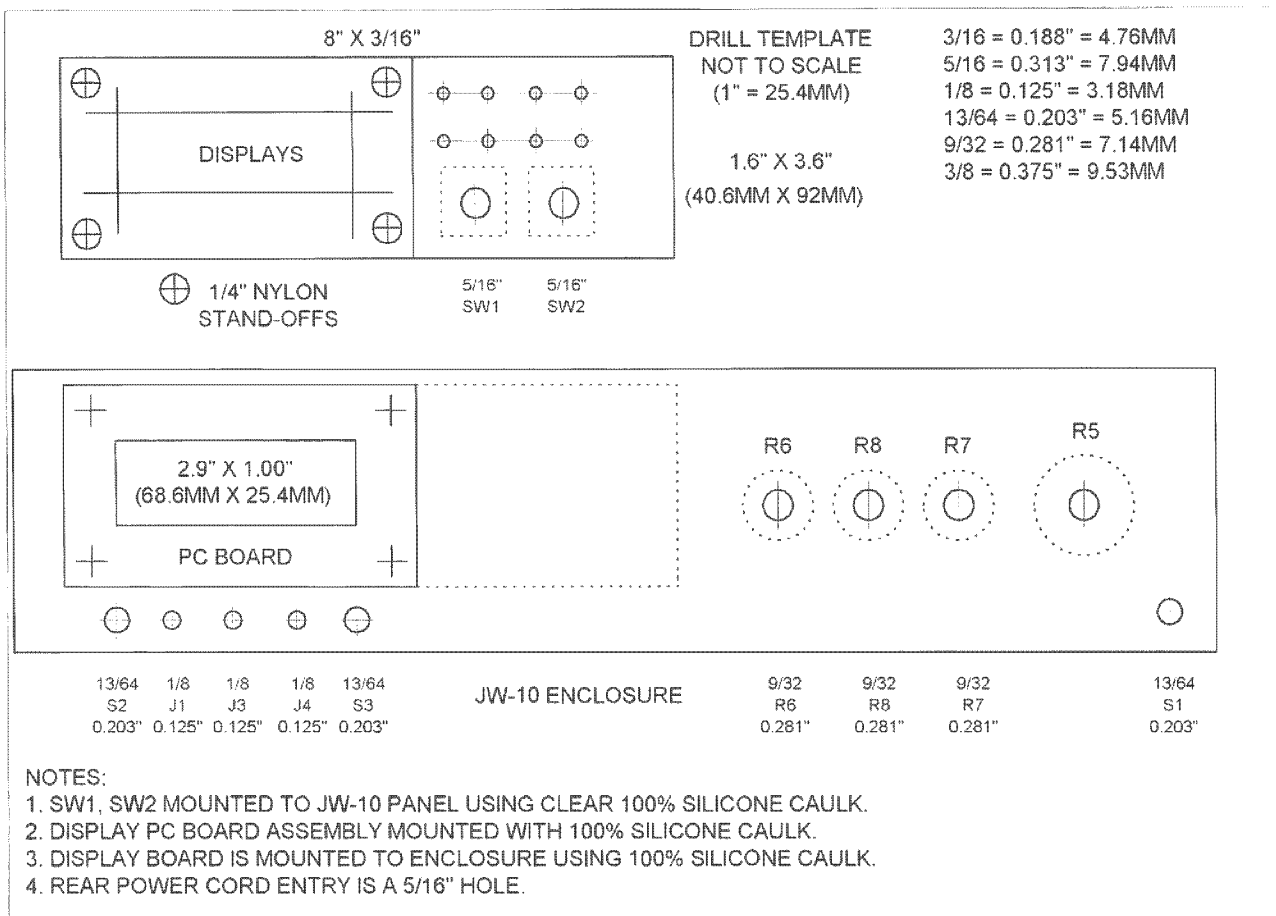


Fig. 10. Enclosure template.

calibrate the frequency ranges. We are using timing capacitors which have tolerances of 5 and 10 percent and do require a selected resistance value to set the bottom end frequency of each of the four ranges. If you do not care about the exact setting, these resistors can be omitted. Use jumper wires in their place. The triangle, square, and

pulse frequency goes from 1 Hz to about 15 kHz in the four ranges. The sine wave goes from 1 Hz to about 50 kHz in four ranges. The frequency counter measures the exact frequency in all bands, which is a marked improvement over a calibrated dial knob. The calibration is complete when you adjust the triangle wave to the same

frequency as the sine wave. Set the sine wave in the second band and read the frequency. Then move to the triangle function and calibrate it to the same frequency by adjusting R14. That is all there is to it! Well, that is about it for this project! It took quite a little bit of time to design this one, but I feel it was well worth the trouble.

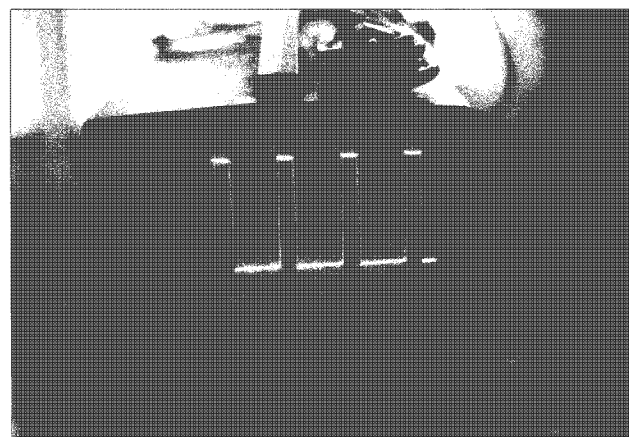


Photo E. Pulse wave.

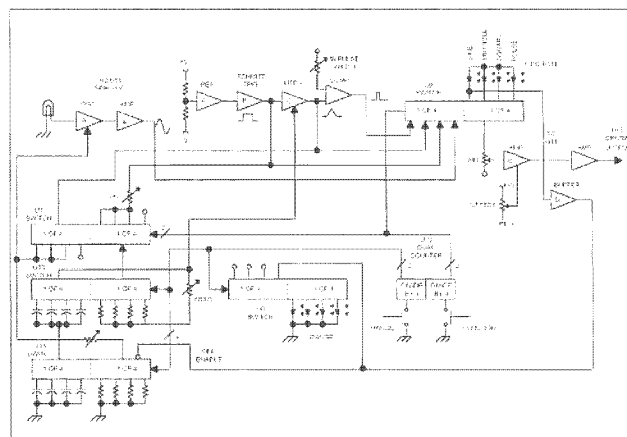


Fig. 11. Overall block diagram.



HEADER	ITEM	PINS			
HD-1 R9	22K RES	6,13	HD-8 R41	--- CAL RES	3,22
HD-1 R10	15M RES	7,12	HD-8 R42	--- CAL RES	4,21
HD-1 R11	10K RES	5,14	HD-8 R43	--- CAL RES	9,16
HD-1 R12	2200 RES	2,17	HD-8 R44	--- CAL RES	10,15
NOTE: C13--C17	0,1MF CAP	Part of IC's	HD-8 R45	--- CAL RES	11,14
HD-1 C19	100PF-NPO CAP	8,9	HD-8 R46	--- CAL RES	12,13
HD-1 C20	10PF-NPO-CAP	15,16	U-15 R26	10K RES	1,16
HD-1 C21	0,01MF CAP	1,18	U-15 R27	22K RES	2,15
HD-1 C22	0,01MF CAP	3,4	U-15 C32	0,1MF CAP	3,4
			U-15 C33	0,1MF CAP	13,14
HD-2 R3	220 RES	8,11	U-11 C34	0,1MF CAP	1,18
HD-2 R4	220 RES	2,17	U-11 C35	0,1MF CAP	9,10
HD-2 C10	100MF CAP	15,16			
HD-2 C11	100MF CAP	3,4	U-12 C36	0,1MF CAP	1,18
HD-2 D1	1N5232 DIODE	9,10	U-12 C37	0,1MF CAP	9,10
HD-2 D2	1N5232 DIODE	1,18			
HD-2 Q1	PN2222 TRAN	12,13,14	HD-9 R28	56K RES	5,20
HD-2 Q2	PN2907 TRAN	5,6,7	HD-9 R29	100K RES	6,19
			HD-9 R30	100K RES	7,18
HD-3 R13	150 RES	5,20	HD-9 R31	56K RES	8,17
HD-3 C23	0,1MF CAP	23,24	HD-9 R32	150 RES	21,22
HD-3 C24	0,1MF CAP	1,2	HD-9 R33	150 RES	15,16
HD-3 C25	0,1MF CAP	11,12	HD-9 C38	0,002MF CAP	1,2
HD-3 C26	0,1MF CAP	13,14	HD-9 C39	0,002MF CAP	3,4
HD-3 C42	0,001MF CAP	7,8	HD-9 C40	0,002MF CAP	9,10
HD-3 C43	0,01MF CAP	9,10	HD-9 C41	0,002MF CAP	11,12
HD-3 C44	0,22MF CAP	15,16	HD-9 B3	#1240 Bulb (3mm) T-1	23,23
HD-3 C45	4,7MF CAP	17,18	HD-9 B4	#1240 Bulb (3mm) T-1	13,14
HD-3 B1	#1240 Bulb (3mm)	21,22			
HD-4 R15	1K RES	5,20	HD-10 R34	1200 RES	10,15
HD-4 R16	1K RES	6,19	HD-10 R35	1800 RES	11,14
HD-4 R17	330 RES	10,15	HD-10 R36	1200 RES	12,13
HD-4 C27	0,1MF CAP	24,23	HD-10 C34	0,1MF CAP	1,24
HD-4 C28	0,1MF CAP	1,2	HD-10 C35	0,1MF CAP	9,16
HD-4 C29	0,1MF CAP	21,22	HD-10 U22	TL064A IC	2-7,17-23
HD-4 C30	0,1MF CAP	11,12			
HD-4 C31	0,1MF CAP	13,14	PC Board R1,R2	56-1W RES	-----
HD-4 C52	0,1MF CAP	3,4	PC Board C1,C2	6800 MF CAP	-----
HD-4 C18	0,1MF Cap (Axial)	9,16	PC Board C3-C4	0,01MF CAP	-----
			PC Board C5-C8	0,1MF CAP	-----
HD-5 R18	1K RES	10,15	PC Board C9	100MF CAP	-----
HD-5 R19	1K RES	11,14	PC Board C12	220MF CAP	-----
HD-5 R37	560 RES	1,24	PC Board DB1	Diode Bridge	-----
HD-5 R11	100K RES	12,13	PC Board L-1	Choke	-----
			PC Board U-1	LM-2940CT	-----
HD-6 R20	1K RES	1,24	PC Board Z-1	MOV	-----
HD-6 R21	33-1W RES	2,23	PC Board SIP	SIP's	-----
HD-6 R22	10K RES	5,20	PC Board R14	10K-10T-Trim POT	-----
HD-6 R23	10K RES	6,19			
HD-6 R24	330 RES	7,18	JW10 Front R5A,R5B	10K-10T POT	-----
HD-6 R25	330 RES	8,17	JW10 Front R6	100K-1T-POT	-----
HD-6 C51	10PF-NPO CAP	21,22	JW10 Front R7,R8	10K-1T-POT	-----
HD-7 D5-D12	LED's	-----			
HD-8 C46	0,001MF CAP	5,6	S01,2,3,4	U2-U5	DIP18
HD-8 C47	0,01MF CAP	7,8	S05	U6	DIP16
HD-8 C48	0,22MF CAP	17,18	S06,7,8	HD1,2,8	DIP18
HD-8 C49	4,7MF CAP	19,20	S09,10	U12,U13	DIP18
HD-8 R39	--- CAL RES	1,24	S011-S017	U7-U10,U13-15	DIP16
HD-8 R40	--- CAL RES	2,23	S018-S025	HD3-HD10	DIP24 (S)
			S026,27	U16-U21	DIP24 (W)
			END	NOTE: S01-S05 Sockets Author used sockets with on board 0,1MF capacitors...vice DIP18.	

Table 2. Header component pinout locator.

Good luck on yours! I can answer reasonable questions if I receive an SASE with the request. For those folks who would like more research information, I have included some references.

#### References

1. *Ham Radio Magazine*, Sept., 1979; Aug. 1980; June 1982; April 1988.
2. *Electronic Design Magazine*, July 1993.
3. *National Semiconductor Op Amp Data Book*.

#### Parts sources

1. Hosfelt Electronics, catalog 1-800-524-6464.

2. Jameco Electronics, catalog 1-800-831-4242.
3. Mouser Electronics, catalog 1-800-346-6873.
4. Digi-Key Electronics, catalog 1-800-344-4539.
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# Shedding Some Light on Dimmers

*Why not put one of these triacs to use?*

*When you need to control the AC mains and an auto transformer like a Variac is not available, the line voltage can be controlled with an inexpensive light dimmer. Light dimmers are available from the local hardware store or one is easy to build.*

Controlling the voltage to an inductive load like a transformer's primary with a light dimmer may require a little cut-and-try, because light dimmers are intended to control a resistive load and not an inductive load. An appropriate RC in parallel with an inductive load can make it look resistive.

In a light dimmer, a triac or bidirectional triode thyristor switches the voltage to the load for part of every half-cycle. The voltage across the load will be near maximum if the triac switches on at the start of the half-cycle and be less if the switching occurs later in the cycle. The switched voltage is no longer a sinusoid and in some cases may cause difficulties. For example, a power supply with a capacitor input filter. More about that later.

A triac that controls the conduction angle of the dimmer is switched on by a voltage applied between the gate and terminal 2, the cathode. **Fig. 1(a)** shows the voltage-current characteristics of a triac. The device is bistable; the triac exhibits either a high impedance (Off state) or low impedance (On state). For either polarity of applied

voltage, the device can be triggered into the on state by a pulse of current of either polarity into the gate. Once triggered, the triac remains in the On state until anode current is reduced to zero by the external circuitry.

The pulse of trigger current to the gate is obtained with a diac. The diac is a two-terminal bistable bidirectional switch with voltage-current characteristics shown in **Fig. 1(b)**. The diac exhibits either a high impedance (Off state) or low impedance (On state). The device exhibits a high impedance, low-leakage-current characteristic until the applied voltage reaches the breakover voltage. The breakover voltage is in the order of 35 volts. Above breakover, the device exhibits a negative resistance, so that the voltage decreases as current increases. When the diac turns on, a pulse of current triggers the triac on. Some triacs have the diac function built-in, but a dimmer using a simple triac requiring a diac is described. An SBS (silicon bilateral switch) like the 2N4991 can be used instead of a diac. They both perform the same function and are essentially equivalent devices.

In the basic light dimmer shown in

**Fig. 2**, a diac is used in conjunction with a capacitor to generate current pulses to trigger the triac into conduction. The voltage on the capacitor increases until it reaches the breakover voltage of the diac, at which point the diac voltage becomes low and the capacitor discharges into the triac gate.

At the beginning of each half-cycle, the current in the triac and load is zero and the triac is in the Off state. The triac acts like an open switch. The entire line voltage appears across the triac and none appears across the load. The voltage across the triac drives current through the pot R1 and charges the capacitor C1. When the capacitor voltage reaches the breakover voltage of the diac, the triac is triggered on. At this point, the triac looks like a closed switch and the voltage is applied to the load for the remainder of that half-cycle.

The resistance of the potentiometer determines how quickly the capacitor charges. When the resistance of R1 is low, C1 charges more rapidly, breakover of the diac is reached earlier in the cycle, and the power applied to the load increases.



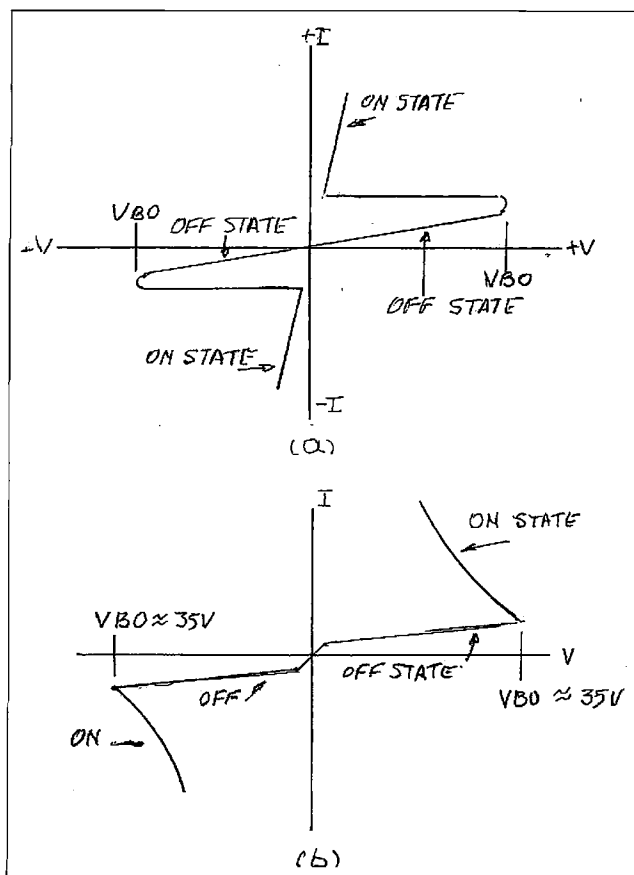


Fig. 1. (a) A triac is gate-controlled bistable. (b) A diac is a bistable diode.

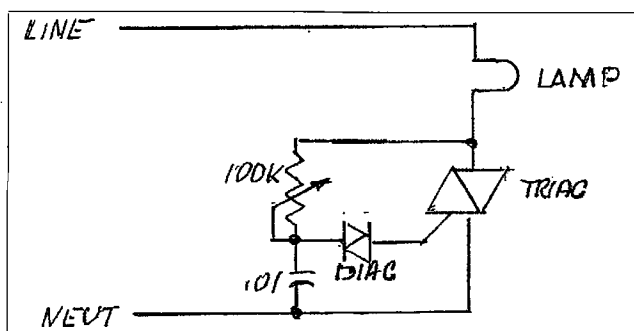


Fig. 2. A light dimmer phase-controls the voltage across the load.

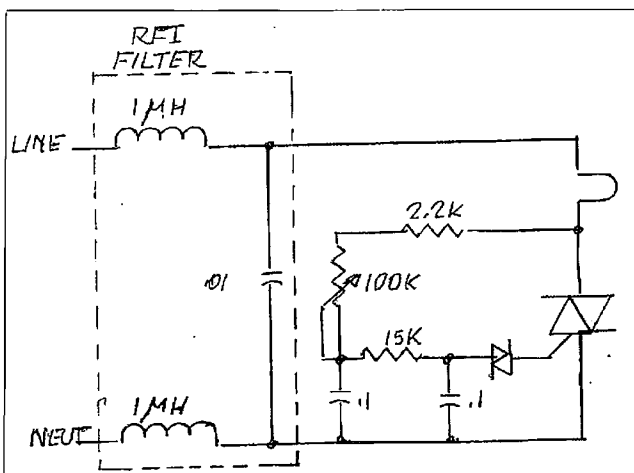


Fig. 3. An extra RC reduces hysteresis. A filter can reduce conducted interference.

Most commercial light dimmers have the circuit shown in Fig. 2. This circuit has hysteresis. That is, the triac doesn't switch on when the control is set for minimum load voltage. Adding an additional R and C as shown in Fig. 3 reduces hysteresis effects and extends the effective control range of the light-control potentiometer. Since including the extra R and C increases cost, most commercial light dimmers expect you to accept the hysteresis.

Since the triac switches when the line voltage is nonzero, noise can be produced when the triac switches on. Again, adding the noise-reducing filter increases cost, so noise is ignored. However, a 0.01 $\mu$ F capacitor and two small inductors can filter the noise from the line. Many times, the inductors are just a few turns wound on a piece of ferrite. This arrangement takes care of the conducted noise but doesn't do anything for radiated noise — a metal minibox enclosure is needed to control the radiated noise. If

you have only a plastic project box, line it with aluminum foil and you'll be in business.

The light dimmer is intended to control a resistance, a light bulb, in which the voltage and current are in phase, but when the load is inductive, like a transformer or universal wound motor, the voltage and current are no longer in phase. The inductance tends to keep the current flowing even when the voltage is zero. The inductive current in the anode holds the triac on while the line voltage goes through zero.

A series RC in shunt with the inductor can put the voltage and current back in phase. That's where the cut-and-try comes in. A capacitor across the load can absorb the inductor's current and make the current in the triac zero when the voltage is zero. The resistor in series with the capacitor damps any tendency of the L and C to ring.

Accommodating the inductance is straightforward if the exact inductance

is known. But usually the inductance isn't known. Finding the capacitor that will absorb the inductive current and a resistor to eliminate ringing requires some cut-and-try. The ringing suppressing resistor is not terribly critical, but if it is too large the effects of the capacitor can be compromised. Something in the order of 100 ohms is a good starting point.

Continued on page 55

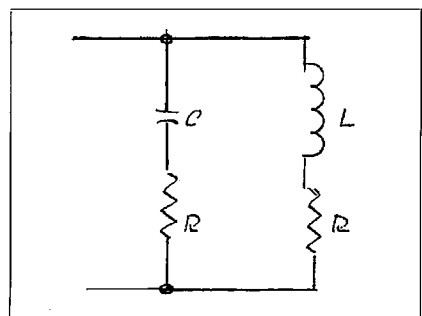


Fig. 4. The load can be made to look resistive.



# Eager for Meager

*Try an 11m vertical on 160.*

*Several years ago, Richard KA1INO, now a silent key, gave me an old 11-meter half-wave vertical for conversion to 10 meters. I used the antenna on that band for several years and then changed it to a quarter wavelength vertical on 15 meters.*

The antenna was a nice supplement to my G5RV dipole as I completed WAS on 20, 15, and 10 meters. There were times that the dipole did not work as well as the vertical and vice versa.

After reading the *ARRL Antenna Handbook* on base-loaded short antennas (8-foot whips are suggested) for mobile work, I decided to try a conversion of the venerable 11-meter antenna to the other end of the HF spectrum: 160 meters. My reasoning was that I would never be able to erect a full quarter wavelength vertical for the top band and had to be ready to compromise. Some other local amateurs have suggested to me that making contacts on the dummy load would probably be as productive as using a short vertical on 160. However, placing the project in context, it is clear that a loading 16-foot vertical on 160 meters is neither

more nor less optimistic than using an 8-foot vertical on 80 meters.

**Table 1** shows that a 16-foot vertical is 12% of a full quarter wavelength on 160 meters. The same percentage is found for an 8-foot vertical used on 80 meters.

The computations needed to determine the inductance of a coil for base loading are found in *ARRL Handbooks*. *The Antenna Handbook* chapter on "Mobile and Marine Antennas" states that:

1. The height of the antenna in electrical degrees is:

$$h = (L/984) * F * 360$$

2. The mean characteristic impedance is:

$$K_M = 60 * ((\ln(2 * H/a)) - 1)$$

3. The inductive reactance required is:

$$X_L = K_M * \cot(h)$$

Determination of inductance from reactance for a given frequency is

described in the *ARRL Amateur Handbook* chapter on "AC Theory and Reactive Components."

4. The corresponding inductance is:

$$L = X_L / (2 * \pi * F)$$

The symbols used in the formulas are:

h = antenna height in electrical degrees

F = frequency in MHz

L = antenna length in feet

$K_M$  = mean characteristic impedance

H = antenna length in same units as "a"

a = antenna radius in same units as "H"

$X_L$  = inductive reactance

$\pi = 3.14$

Notes:

$\cot = (1/\tan)$

"H" and "L" are antenna length. "L" must be in feet; "H" may be in any unit also used for "a".

In the case of my topband antenna, I was able to stretch the overall length of the 11-meter unit to 16 feet 4 inches

	160m	80m
1/4 wavelength	130 ft.	67 ft.
% of 8 ft.	n/a	12%
% of 16 ft.	12%	n/a

**Table 1.** Comparative length percentages.



(16.3 feet). The antenna is made from three sections of aluminum tubing: 1.25 inches, 1 inch, and 0.5 inch diameters. I decided to use a blended diameter of one inch for computations because no formulae were readily available for tapered elements. Solving the equations for the required inductance gave a value of 158  $\mu\text{H}$ .

The actual coil design was simplified by using a utility program called Coil Designer, by K6MLO. I chose a PVC coil form that is 11 inches long

and 2.375 inches inside diameter. Using 18 AWG wire, I found that I needed 108 evenly spaced turns.

The coil form has a PVC end cap on each end with an SO-239 socket on the cap that connects to the base of the antenna. A male PL-nnn adapter makes the coil to antenna connection. Black plastic electrical tape is wound over the entire coil and held in place with plastic wire-wraps. A drip hole was made at the bottom of the lower end cap to provide drainage for any moisture that might find its way inside the coil form.

The biggest compromise in my design was the decision to use a single one quarter wavelength 18 AWG wire radial as a counterpoise. The antenna is on a bracket at the end of my garage. I had space and resources for a single radial that meanders across the building and then follows a fence in an arc

around the back yard. Multiple radials or a good earth ground would probably improve the performance of the antenna, but this was a low budget job, intended for casual use only.

How did the project turn out? Pretty much as expected. My intention was to recycle an old antenna into a topband vertical that would allow casual use on CW or SSB. I have managed to make contacts all over New England, the mid-Atlantic area, and as far as Ohio. The signal reports have been adequate, but not stellar. It seems likely that anyone who is interested in a low profile 160-meter antenna could use the vertical portion of this design and work up a better grounding or radial system in time for next winter. Despite predictions from friends, the final result does a much better job than the dummy load that I use to tune up the transmitter. 72

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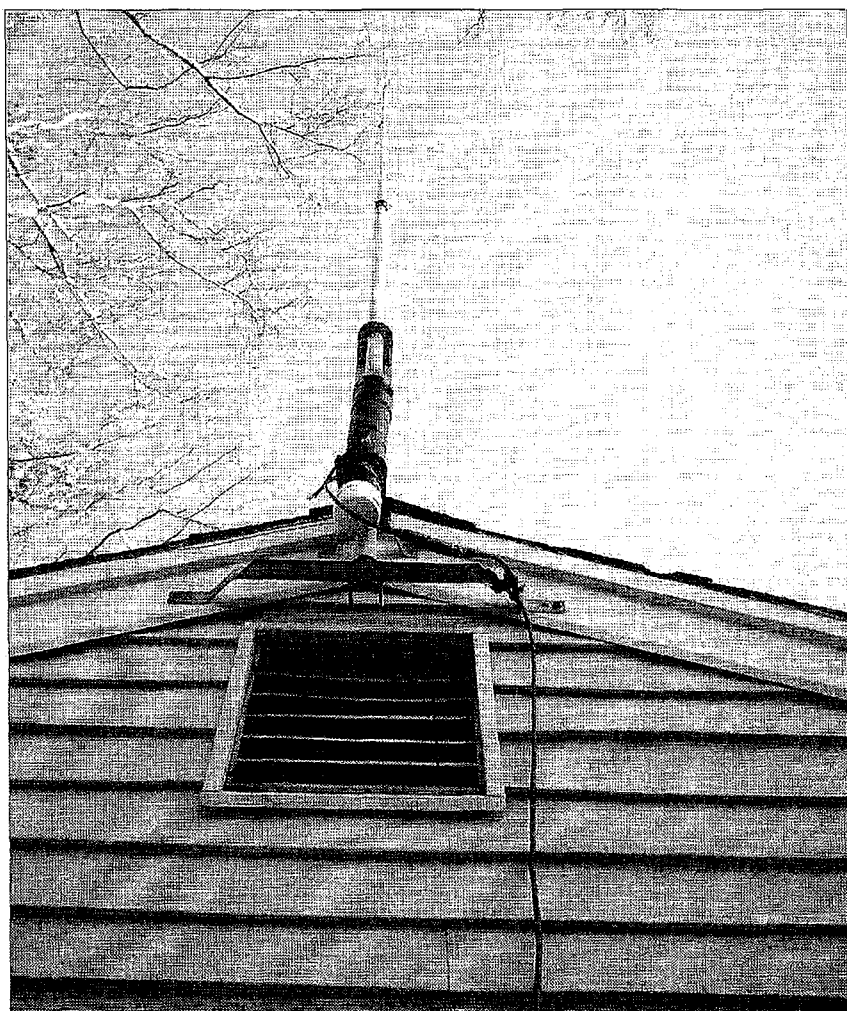
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**Photo A.** This meager antenna is capable of operating on 160 and 80 meters.



# Shack Switch for Foot Fetishists

*Not that it's THAT kinky.*

*Although I get lots of comments from visitors in the shack, the Ultimate Foot Switch was born out of frustration and definitely serves a function far greater than entertaining visitors.*

When I went from a push-to-talk mic to a foot switch to control my transceiver, I never thought about the possibility of not being able to find the switch under the desk with my foot.

On more than one occasion while I was getting ready to slide my call letters into that small window between the time that the DX station stops transmitting and the rest of the ham community starts calling him, I missed my chance because the foot switch moved and I couldn't key the transmitter.

Over the next few weeks, I tried to

position the foot switch so that I could find it under the desk without looking. I tried to hold it in position with double-sided tape, then Velcro strips, and then I finally mounted it on a small board. I still had the same problem. Basically, the foot switch I was using was just too small, and too light.

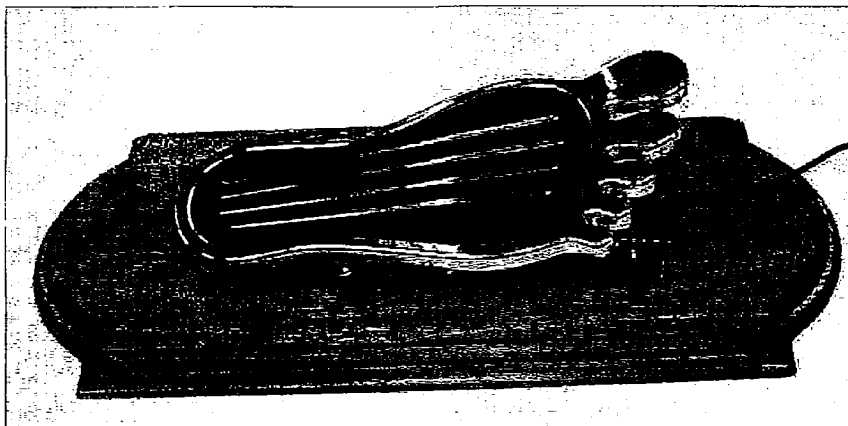
I mentioned this problem on our local repeater and got some interesting suggestions. The next day, I stopped in at the music store to find out what type of a foot switch musicians use, and I was somewhat disappointed in their lack of ingenuity.

One thing that the lady of the store did show me was what they call a wa-wa pedal. Not exactly what I wanted, but now I was getting some flashbacks to the '60s, when we had fuzzy dice on the mirror and a large foot strapped to the gas pedal of our cars. No, I don't know why we did it, and you really had to be there to understand!

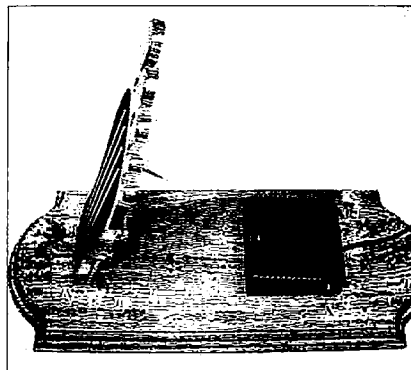
Now I knew what I wanted, and I remembered where I saw it. I thanked the storeowner and was on my way.

Here in New Jersey, we have a few

*Continued on page 55*



**Photo A.** The Ultimate Foot Switch.



**Photo B.** A small hinge mounts the "foot" to the wood base. Use double-sided foam tape to mount the switch.



# Ashore at Sacrifice Rock!

*The saga of a masterful DXpedition.*

*It all began one evening in early 2001, when Chets VU3DMP dropped into my office after work. We began talking about an IOTA operation from St. Mary's Island, which was fairly close by. A few months later, we successfully activated AS-096, our first IOTA, and our first "not-so-small" operation.*

The experience and the sheer thrill we gained from organizing and participating in the AS-096 IOTA really pushed us to form a group of like-minded, activity-thirsty hams, the VUIOTA Group. We were, and still are, an informal group without presidents, secretaries, and that kind of stuff.

"What next?" was the most asked

question. Obviously another IOTA. This time we aimed for the Sacrifice Rock, in the Kerala group of islands — an inactivated island, and a not-so-popular place either. We began working on getting more information about the island in September. It took us a good couple of months to get full information about the place, make two visits to the island and realize it was

only a plain solid rock in the middle of nowhere.

The first reconnaissance visit was pretty discouraging — there was no boat access, there was not a single tree or even a leaf on the solid rock. It took about one hour by those tiny fishing boats from the coast of Thikkodi near Bagadara in Kerala (about 45 km north of Calicut or Kozhikode). The rock was standing in the middle of the sea without any sand around anywhere, unlike what we imagined any island to have.

This made it impossible for the boat to move very close to the rock — it had to be anchored some distance away, otherwise it would be pushed toward the rock by the waves and eventually get damaged. So we had to swim to the rock from the boat (some 100 feet or so), and the depth of the water was about 18 meters all the way. What's more, the entry point on all sides of the rock were filled with razor sharp barnacles, and should one step on them without some footwear, or happen to be pushed against the rock by the waves, he's sure to cut himself very badly. To top it all off, the rock was pretty steep at the places where the boat could go near it.

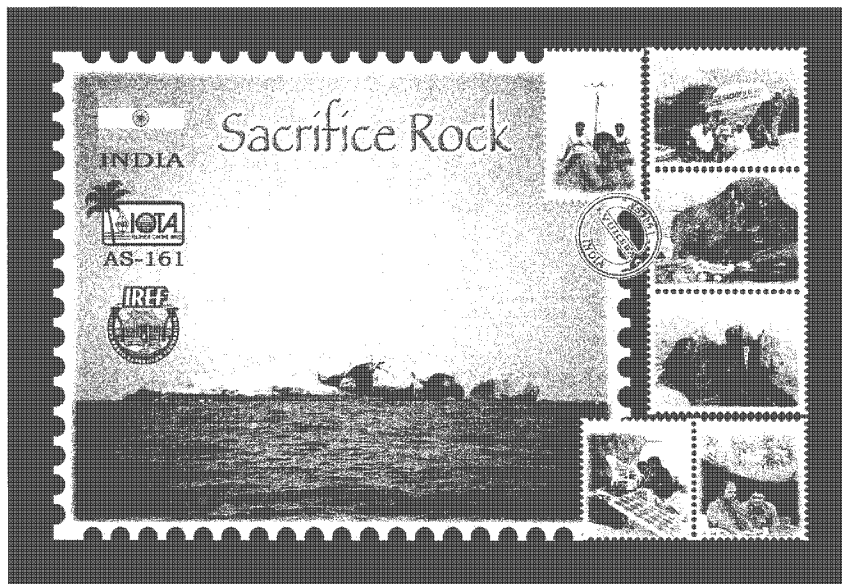


Photo A. DXpedition QSL card.



The very idea of carrying in the station gear was mind boggling. The four of us who made the first inspection visit, myself, Chets VU3DMP, Ro VU2RDQ, and Mur VU2MTT, though never speaking it out aloud, definitely thought this to be impossible.

Despite these discouraging thoughts, we still went ahead with the formalities involved with the WPC (licensing authority in India) for making the DXpedition. Lots of questions began popping into each of our minds about the various "how to's" associated with the trip. How to take the station through the water? How to transport people who do not know swimming (there were a few such people)? How to climb the rock with those huge lead acid batteries, even if we managed to somehow get them from the boat to the bottom of the rock? How to erect the antenna and shelter on the rock, which was solid granite without a patch of loose soil? And so on. Too many questions, no answers.

Off we went to a local beach, called Kaup. What came out of a few hours of thinking out on the beach that evening was to use that magic hardware known as "anchor bolts" for antenna erection and tent erection — this required us to carry some hammer drilling equipment, an electrical generator to power the drill, and lots of anchor bolts.

These are wonderful things to have. All we needed to do was to drill a suitable size hole in the rock, insert the bolts, and fasten them — they expand on the inside and anchor into the rock really hard. We could then use them to hold the guys of the antenna masts and the tents. Another idea was to build a raft out of plastic drums — we thought this would help us transport all equipment from the boat to the rock. The rest of the arrangements were pretty standard, just like our previous IOTA, but we decided to be very strict on the BOM, since excess luggage would only mean excess trouble. We also decided to make one more trip, sort out some of the local permission issues, and just have another proper look before we actually finally went.

The day we decided to make our

second inspection trip to the rock apparently turned out to be a new moon day. This day is superstitiously considered bad to set out to do anything worthwhile. None of us believed in this, and we planned to travel to the rock anyway. This time additionally Prakash (VU2JIX) accompanied the

remaining four who had gone the first time. Since I lived another 70 km away from the city where we had to board the train, and where the remaining four lived, I camped at Mur's home the night before we set out. The train was to leave at 03:40 hours (local time). Chets and Prakash also joined us here in Mur's place, and we all were talking until about 1:30, when we decided we'd better have at least an hour of sleep. We woke up at about 2:30, had a quick bath, and set out. When we went outside we realized Chets' motorbike had been stolen. He didn't believe me when I noticed it first and told him, he thought I was joking and had hidden it someplace. We were already getting late to catch the train. Dilemma: Whether to go or not to, as Chets was pretty upset — quite naturally so. We made a quick trip to the local police station, and tried lodging a complaint — though they began sending out wireless messages to the patrol all around the town, we were not able to formally lodge the complaint, as the concerned person wouldn't work at this time of the night. Meanwhile, Ro, who had independently gone to the train station from his home, had already bought us all the travel tickets and was waiting with some other mountaineering friends who wanted to join us to see the rock. Consoling Chets that the police were now working on the motorbike search, all of us sped away to the train station — only to see the last compartment of the train just moving out of the platform. Ro was in the train with four



*Photo B. One of the sights on the Sacrifice Rock — a delicately balanced rock structure.*



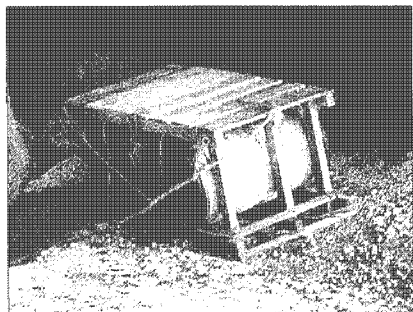
*Photo C. Main camp area — all the gear is slowly beginning to come in.*



*Photo D. Chets VU3DMP burns the midnight oil as SWL Adarsh looks on.*

extra tickets and some other friends. The four of us who missed the train inquired to find that there was another train traveling in about 45 minutes but from another train station on the outskirts of the city. We could make it. We also decided to have a quick look around Mur's house locality to see if we could find Chet's mobike someplace. No luck, though. When we reached the other train station, the train had already arrived. I volunteered to get the tickets, while the remaining three would get all the stuff near the platform inside





**Photo E.** Our faithful but overbuoyant raft made it possible to transport everything over the water.



**Photo F.** Antenna mast for base station (Fritzel) with Indian national flag (it was Republic Day in India), and our banner.

the station. We were carrying one radio station, including a lead acid battery (which we now realized was a stupid idea) to try it out from the rock. While they were carrying all the things to the platform inside, I just managed to buy four tickets and rush inside to find out the train had already begun moving. Man, this was turning out to be a nightmare — and whatever

superstition-free minds we all had now began wondering if there was indeed something bad about this new moon day, as the elders used to believe. We just got in whatever compartment that was closest, and decided to sort out our actual compartment once we were in. Getting in with those things, especially the battery, was pretty adventurous.

The compartment we went in was full up to its brim. There were no seats even to sit on temporarily, and much to our dislike we ended up sitting on the floor near the toilets. (Prakash and I then went searching for our actual compartment, should the ticket inspector fine us for being in the wrong place. To our disappointment, the connection doors to other compartments were locked, so we were forced to continue where we were.) Meanwhile, Chets was worrying about his mobike. He eventually decided to get off at the next station to go back home and try looking for the mobike. It seemed pretty sensible, so he got off at the next stop. Stops were really short, so we didn't risk transferring ourselves with all that luggage to our actual compartment (God knows how far it was anyway!). As our destination (Badagara) approached, some seats became vacant. There was hardly 30 minutes of journey remaining — we were thanking our lucky stars that the ticket inspector didn't turn up after all. When it was just 5 minutes till Badagara — lo, the ticket inspector. He just wouldn't listen to our story about getting into

the train at the last minute with the heavy luggage, and the fact that the connection doors were closed, and the fact that we were sitting just outside the toilet for most of the journey. We ended up paying heavy penalty — Hell, no more doing anything on a new moon day, we decided.

We met Ro and his other mountaineering friends at the Thikkodi beach. The boat people and the local fishermen folk, now seeing us for the second time, probably realized we were indeed not joking about staying on that rock in the sea for two days. They also saw prospective business due to increased demand — from zero in the last few years to two trips in within a couple of months for nonfishing purposes! Their rates were already up by about 30% this time. No alternative, so we had to accept. We set out toward the rock. This trip, however, was a real morale booster. It didn't scare us as much as the first time. Probably because things looked much more familiar than the very first time. We knew exactly where we were going, how long it would take to reach there, and how things looked at the other end. This time we looked for the most convenient place to enter on the rock, and earmarked locations on the rock for setting up the various antennas, stations and the main camp. Another idea that we had, about transporting stuff through a rope-way from the boat, looked impossible once we went there, so we decided to stick with the raft idea.

After we went back on land we visited the local police authorities, and were successful in gaining permission to stay on the rock for two days and to travel by fishing boats. Though this is not a tourist spot, and there was no formal mode of transport, the police were very understanding and realized the context well and gave us the permission. This had always been a big question mark, so once this was cleared up we were literally on cloud nine.

Each way to reach the rock from our hometown took about 5 hours by rail, another hour by road, and finally another hour by sea. Had we used the air mode to travel somewhere in between, we would have covered them all. Probably the cloud nine we were in a little while ago could be attributed to air travel?

Things appeared more concrete after this trip. We began making all the arrangements as the days went by. First we had the raft built by a boatbuilder



**Photo G.** Our team, left to right: Chets VU3DMP, Su VU2RDI, Prakash VU2JHX (holding the left end of the banner), Ro VU2RDQ, Mur VU2MTT, Manu VU2JRO, SWL Laxminidhi, Pai VU2PAI, Boatsman Baijo, Sri VU2SBJ (holding the right end of the banner).



friend. He made it out of scraps of wood and two empty plastic oil drums. We wanted to test it out so off we went to the local fishing harbor, and tested it out — it seemed too buoyant — appeared as if it required some support from the sides to ensure it didn't topple. We decided that two people should escort the raft while the raft carries the station stuff, else it would topple. To have a person sit on the raft was out of question. We did not have the resources or the time to have a better one built.

Transport by road instead of by rail was preferred as we had a lot of stuff that was not practical to be taken on the train. We arranged a 15-seater van, and requested the driver to have some seats removed to accommodate the raft and the rest of the stuff.

D-day arrived. Our final team was as follows: Chets VU3DMP, Prakash VU2JIX, Ro VU2RDQ, Su VU2RDJ, Sri VU2SBJ, Pai VU2PAI, Mur VU2MTT, Manu VU2JRO, SWLs Laxminidi and Adarsh. Ten of us in all. We were to set out at 7:30Z on the 25th January 2002. We soon realized we were running late and also that the van wouldn't be able to accommodate all the stuff and all the people — some more seats had to be removed to accommodate the raft. We decided some of us would use the train while some would go on the van.

We all reached our destination in one piece. The van people arrived well before the train people in the late evening, and occupied the dinky but well known hotel in Bagadara which was arranged by a friend. The dinner was simple but good, and we were also paid a visit by the friend who arranged this hotel. The place Bagadara is located in the neighboring state of Kerala, and most speak only the local language Malayalam. Only a couple of us in the entire team knew about 50% of the language. It was quite some achievement to communicate one single sentence for the rest of us.

We slept as early as we could, and woke up at about 4 a.m. All of us had a quick shower, the only fresh water shower that would be possible for the next two days, and drank the coconut

water that was so kindly provided by the friend who visited us the previous night. It took quite an effort to get the van out of the cramped parking area of the tiny hotel, and we were off to the beach by about 6 a.m.

We reached the Thikkodi beach

by about 6:30 a.m., and began unloading all the stuff from the van to the beach as close to the water as the van could possibly go in the sand. We soon realized that the boats that were originally spoken for were already out on their fishing duties as early as 4 a.m., though we were assured they wouldn't be going as a special case to accommodate our transport arrangement. The boats came back only by about 9. We had a light breakfast on the beach meanwhile, and began loading the boats.

We thought we should get some extra lifesaving equipment, as the ones we had were damaged. So two of us went in search of tire tubes, which are pretty good alternatives for life jackets. The sea was already getting pretty worked up, and the morning was windy. The boat people discouraged our traveling on that day unless we set off immediately. Of the two boats that were being loaded, one of them set off in a hurry with only four of us. The remaining six were still on the shore.

The six who were on the beach waited for the two who had gone in search of the tires. They had already taken over an hour, so the second boat had started off with only Ro and few other boatmen. The plan was to have a third boat get the rest of the people and also some stuff that wouldn't fit in the first two boats. The whole launch of the boats from the beach was so mixed up that we were totally confused by what was happening. The boat people simply refused to listen as they felt that they couldn't wait any longer on the beach.

The first boat that took off pre-schedule had Su, Laxminidhi, Manikant,



*Photo H. A view of the gigantic Sacrifice Rock.*



*Photo I. The raft, being loaded with our belongings after the event — it would then be pulled by ropes to the boat.*

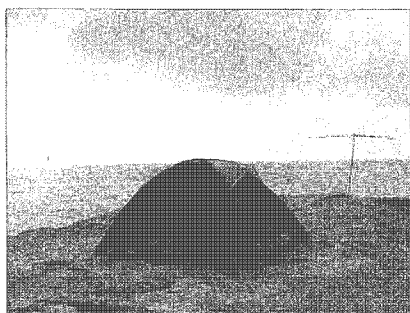


*Photo J. Prakash VU2JIX, center, and other people from the boat, pull the loaded raft toward the boat. This overbuoyant raft kept the owners of our gear very anxious during each trip.*

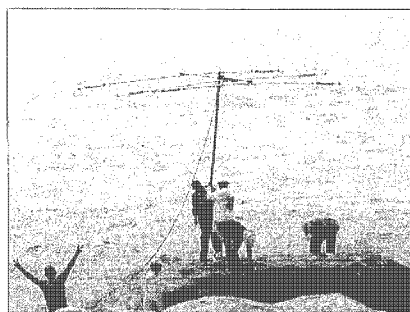
and me on it. Not one of us knew Malayalam, and we never were able to find out why he took off without Ro, who was supposed to come with us in that boat, nor what the plan for the rest was going to be.

In the confusion, the VHF handies were not accessible to any of us, as the entire luggage was mixed up in the hurry. So no way of talking to the rest of the team either. We reached Sacrifice Rock in about one hour's time —

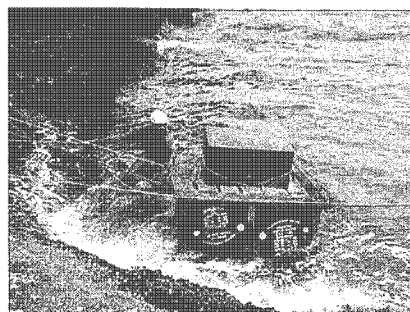




**Photo K.** A view of the tent occupied by the only couple in the team, YL Su VU2RDJ and OM Ro VU2RDQ. One of the antennas is visible in the background.



**Photo L.** MA5B Cushcraft antenna being installed. This was the antenna for Station 1. The mast and guys were fixed to the rock by anchor bolts drilled into the granite. It stood well for the entire two windy days.



**Photo M.** Packing off! The raft gets into the water with another load of gear. It was then pulled towards the boat with the help of several ropes.

Ro's boat was much faster, as it had less luggage. So we arrived almost at the same time though he started out later. The third boat was not yet seen, and we had no idea what its status was. It finally arrived in about 45 minutes, and we began unloading the stuff.

Getting the raft into the water from the boat was easier than we expected. They tied all the three boats together so that those tiny boats wouldn't

topple with all the imbalance in weight while unloading. The sea was not so rough, so the boats went as close as about 10 meters to the rock. At one point, they even took it as close as 2 meters, to one small extended part of the rock, while Su and Manikant jumped on so that they didn't have to get into the water. They had to also do almost a mini pole vault exercise to reach the main rock — they probably preferred this to getting into water. They didn't know how to swim!

As the stuff was being transported over on the raft, two of us, myself and one boatsman, were guiding the raft from the boat to the rock. Ro and others were putting stuff piece by piece onto the raft from the boat. The sharp barnacles and shells stuck to the rock at the intersection of the rock and the water made it pretty difficult to go close to the water to pull off the stuff from the raft.

SWL Laxminidhi at one point underestimated the weight of one pack of several mini lead acid batteries, and lost his balance, to land face up on those barnacles, with the box of batteries falling over his palm. He really hurt himself pretty bad on the back of his hand, and was forced to take it easy for the rest of the expedition. Manikant, who is a doctor, really made things a lot simpler. He took care of cleaning and dressing the wounds. Looking at the amount of bleeding, we would have otherwise probably been very nervous and uncertain what to do next. He said it was perfectly OK and that Lax just needed some rest.

While Su began setting up the camp kitchen, Ro and the others were getting all the stuff to the main camp location on the rock. Baijo, the accompanying helper from the boatsmen team, decided to stay with us through the 2-day camp. The boats left shortly after all the stuff was on the rock. Even if we wanted to return, there was no way we could get out from here. But then we had the radios — we could communicate the world over.

Without wasting any more time, Prakash and I set out drilling holes at suitable points on the rock for anchoring the anchor bolts for antenna erection.

The electric drill was powered by the generator. The process was a lot easier than expected. It took us about an hour to finish enough holes to support all antennas in three different locations. The stations we began setting up were as follows, also in order of setting up:

#### STATION 1: HF

RIG — Kenwood TS-2000, barefoot 100W limit

ANT — 3-element, 5-band yagi, Cushcraft MA5B (10/12/15/17/20m)

CABLE — RG-213

MAST FOR ANTI — 10 ft.

BATTERY — Lead acid

CHARGER — 35VA solar panel

#### STATION 2: HF

RIG — Kenwood TS-850S

ANT — Diamond CP-6 (used for 80/40/20/15/10m)

MAST — 10 ft.

CABLE — RG-213

BATTERY — Lead acid

CHARGER — 35VA solar panel

#### STATION 3: HF

RIG — Icom IC-735

ANT — Fritzel 3-band (20/15/10) vertical

CABLE: RG-213

MAST — 10 ft. aluminum

BATTERY — 125 Ah lead acid

CHARGER — 35VA solar panel

#### STATION 4: HF

RIG — Yaesu FT-840

ANT — Longwire with SGC-230 tuner

CABLE: RG-213

BATTERY — LEAD ACID 88 Ah

Station 1 was set up by about 10:00Z (26th Jan). VU2PAI took over the station and began on 15 meters. The band sounded very, very good. As he began operations on Station 1, the remaining stations were brought up one by one.

Within a couple of hours, we received our AS161 IOTA number from OM Roger Balister (G3KMA, RSGB IOTA Manager). MUR, VU2MTT on CW, mostly occupied Station 2. The TS-850 with the CP6 was doing great. Station 3 was with the IC-735, with the Fritzel 3-band vertical. The vertical



was erected alongside the Indian national flag and the IOTA banner that we hoisted in the center of the rock. Station 3 was just beside the main camp kitchen, and a general-purpose station that was operated by most of the team. This was operated by several operators in random order, so this station did the maximum number of QSOs. Station 4 was set up very late in the evening. For some reason, the FT-840 that was operating there was not very well behaved. Maybe the RF interference from the longwire with the SGC-230 (which was not earthed, as it was too far away from the salt water) was causing the radio to malfunction — the display malfunctioned and bands were changing randomly upon TX. So station 4 was not used very much.

The Rock was so windy that we were not very sure if the tarpaulins that we carried should be used as tents. We then decided not to. So all stations were operating without any shelter. Being windy throughout, the heat from the sun during the day was bearable. A large diameter hat was all that we managed with. Su was mostly in the camp kitchen preparing food and drink for all of us. She did operate once in a while. We lived mostly on bread, orange fruit, lemonade, and noodles. Drinking water was available in abundance — hence nothing to worry.

As night fell, and some bands began closing or all the stations were occupied, the remaining people began retiring after a very long day. Though windy, it was very humid and warm in the beginning of the night. Most just found a relatively flat surface to open out a simple sleeping mat. However, as the night progressed, it got very windy and the temperature began to fall. It was shivering cold on the first night. Ro and Su were the only couple and they were fortunate enough to get to use the dome tent that they had carried. The rest (who were not operating) were sleeping in the open.

The 27th went on very well too. All stations were operating continuously excepting Station 4 due to the radio problem. Station 1 and Station 2 were occupied mostly by PAI and Mur.

Station 3 had to serve the balance team. Those not on the radio were mostly found either exploring the rock and various types of animals living in all the dark corners, crevices, and water puddles on the rock, or trying to swim in the sea (with safety rope and inflated tire tubes of course), or cooking, or eating and drinking. Speaking about eating, excretion (fondly referred to as “faxing”) was a major adventure for most. Some dark corners served the purpose, or we had to wait for nightfall — when wider choices of natural toilets were available. Some others decided to hold on for the entire two days. (I have been advised to leave out the names here.) For those who decided to try out, rules were strictly laid down. Waste paper was used to collect the “stuff” and had to be packed and thrown into the water as far as possible so as to not pollute the rock. It was indeed fun.

Coming back to the radio stuff, the propagation condition from Sacrifice Rock was very good on 10/15/20 meters on the 26th (Saturday), and the peak was high on Sunday. Ten meters was coming through pretty well at 13:00Z and there was a huge pile-up from Europe till 16:00Z. On 27th Jan., from about 06:50Z to 14:00Z, there was a good pile-up from Europe — a station from Oceania, Asia, also came in with good signals.

Fifteen meters was good on the 26th during 11:00Z to 15:00Z, with good signals coming from Europe. The band opened from 17:00Z to



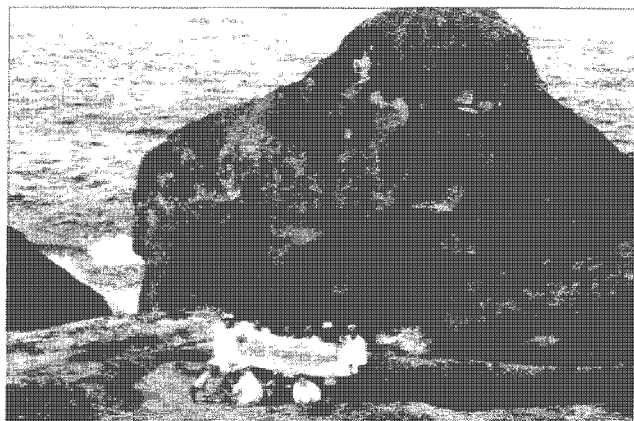
*Photo N. Just before we began sailing towards the Sacrifice Rock on the 26th. The team, with all our stuff piled up prior to loading on the boats at Thikkodi beach.*

18:20Z toward N. America and S. America. On the 27th of January, from 05:50Z to 7:10Z, conditions peaked towards Japan and generated a good pile-up.

Twenty meters was the best during 17:30Z to 03:00Z on 26th Jan with stations from Europe, N. America and S. America coming in with strong signals. On 27th Jan, between 16:00 and



*Photo O. A view of an entire fleet of four fishing boats (the biggest you can get to see here), passing by the rock. The Cushcraft MA5B can be seen in the corner.*



*Photo P. Another strange structure around Sacrifice Rock — a spooky, skull-like structure.*





**Photo Q.** Ro VU2RDQ (center, inside the boat) and other boatsmen unloading close to Sacrifice Rock on the 26th. Sri VU2SBJ (in the water, right) guides the boat to the rock with the aid of another boatman and ropes pulled from the rock.

23:50Z, stations from Europe, N. America, S. America, and Japan came through with big signals.

Conditions on the 12/17/40-meter bands was not getting any better during our operation. There was pretty high static on the 40-meter band and we could not hear any station on the 12/17 meter band. Though we could get stations from India on 40 meters pretty well, there was no DX heard on the 40-meter band.

The Sacrifice Rock was quite small in length and width and the four stations were quite close to each other. We had splatter on the same band if two operators worked at the same time with CW and SSB. We did try the best to avoid the splatter and sometimes we had to down one station on CW or SSB during peak band condition.

We did our best to log maximum QSOs with optimum band propagation

and minimum operating time. We managed about 3,800 in all. We were satisfied, and told ourselves that we did an OK job.

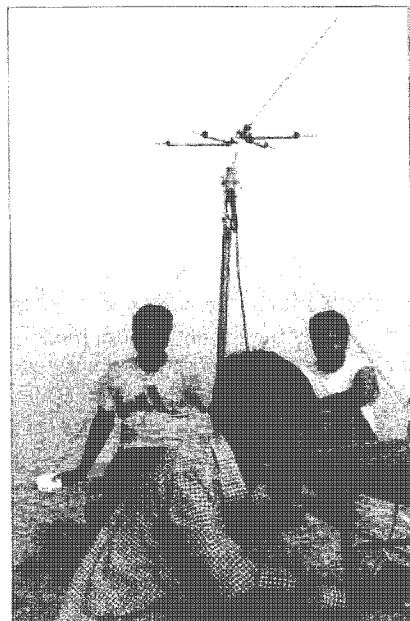
We stopped operations at about 1:30Z on the 28th (Monday). We began packing up all the stuff. Removing the antennas was obviously much simpler and faster. However, waterproofing all the stuff was a major task. It took the 11 (10 of us and the boatsman Baijo) of us more than 2 hours to have all the stuff neatly packed at one place. The boats were asked to arrive by 2:30Z, but they didn't show up.

Eventually by the time they arrived — it was almost 7:00Z. Half the day was gone. The sea began getting rough, as it usually does once the early morning is gone. The boatsmen were really struggling to keep all three boats together. The idea was to get it as close to the rock as possible and tie the three boats up to each other, so that the rough sea would disturb the stability as little as possible due to the three boats being tied together. The depth of water all around the rock was about 18 meters, without a shore to land. The excessive length made the slack in the anchor rope pretty high, which did not allow the boats to be in one place.

After quite an effort they got the boats together one behind the other (long sides parallel) and tied them all up. It looked pretty stable, but was still moving around the threesome. The boats could now not come as close as they did when we landed two days ago. They were at least 120 feet away. Things began looking scary! Getting

all the heavy stuff into the highly unstable raft to travel all the distance in the very rough sea was just not a comfortable thing to think about — especially for those who brought their only radios.

The idea was to guide the raft with three ropes on either side —



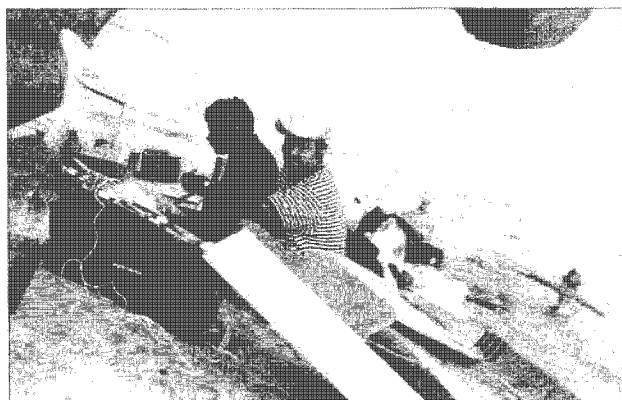
**Photo S.** Mur VU2MTT (center), operates Station 2 while Chets VU3DMP (right) and Prakash VU2JIX (left) look on.

one set from the rock, other set from the boats. Prakash went over to the boat side with the rest of the boatsmen with him. It was quite task to also tie the ropes and get them to the proper locations on the rock. The raft was pretty heavy — it required at least four people on the rock to pull on it for every loading event.

The boatsmen were not game for this idea, and were pressurizing us to cancel the return trip that day — they kept suggesting we set out early next morning. The thought of staying one more day with food and water supplies coming to the end was also pretty scary. We eventually said that if the first raft trip succeeded in getting to the boat OK, we would return the same day — otherwise, it would be the next day.

So we began trying out sending the first consignment. We tied a metal trunk to the raft top and filled it with some heavy stuff that was not very valuable. The thing was so unstable (top-heavy) that it was almost certain it would topple. However, with a lot of difficulty, the raft was guided with the six ropes towards the boat. The first trip was successful — so we decided to indeed leave the same day.

The raft was pulled back to the rock, and the next consignment had a few



**Photo R.** Prakash VU2JIX (left) operates while Sri VU2SBJ monitors the pile-up.



valuable items including two antenna tuners. As it left the rock, the sea that was now pretty rough unfortunately toppled the raft. The trunk with all the stuff was completely in the water. There was nothing anyone could do — fortunately all the stuff was packed tightly in plastic, and the lid of the trunk was also tied — and the trunk held on to the raft — else it would all have gone straight down in the sea — some 18 meters below.

Two boatsmen went and upturned the toppled raft and it was quickly pulled towards the boat. It was not so damaging — the plastic packing was pretty good — and the tuners just had some moisture on the cover inside the plastic. There was also one HF power supply — it was carried just in case we had to use it with the small generator we carried for the drilling machine. It was unfortunately not packed.

Prakash, who recently had purchased the power supply, looked disappointed. It was most certainly useless after all the salt water inside. However we hoped we could do something — we proceeded with the next trip — this time in addition to all the rope guiding business we decided two boatsmen should swim with the raft, holding it from toppling. It then took us about 10 to 12 trips to get all the stuff back on the boat.

Once the stuff was all loaded, there were still people to get in the boats — 120 feet away. What about those who didn't know how to swim? It scared the wits out of them! 60 feet of sea water — without knowing how to swim. It must sure sound scary. There was a rope tied all the way from the rock to the boats. We had to hold it and come across. For those of us who knew swimming, it was pretty easy. Swimming as such was difficult, as the sea was very rough. So the rope guide really helped us. For those who didn't know swimming, the boatsmen accompanied them. Eventually everyone came aboard safe and sound.

The entire exercise was so anxiety-filled that no one had the presence of mind to take pictures of the adventurous boat-loading event. It took us 4 hours to get all the stuff loaded on the

boat — it was about 11:00Z when we started off from the rock.

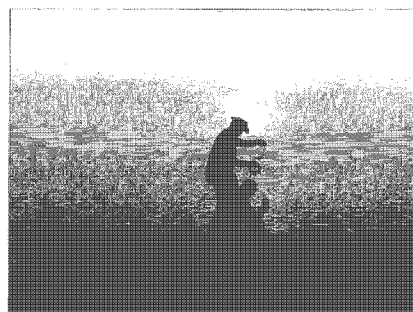
That was the end of all the adventure, we thought. We'd just get back to the shore in about an hour, get off these boats, and load the van with the stuff and get going home.

Unfortunately it was not to be that easy. The sea continued to roughen up. The waves were gigantic. The tiny boats were simply matchless. The boatsmen quickly decided to travel all the way with the three boats tied. It was quite an effort to drive the three boats this way — each had to run the boat very carefully — and in synchrony. Imagine what would happen if the boats on the sides were to get out of synch and one of them ran it faster than the other — the entire assembly of three boats would start turning and probably be unstable. They were pretty good at it.

The waves were huge — they always tried to move on the top of the wave — it was a real roller coaster ride. They had us seated carefully at different points on the three boats to have some sort of balance. Every time a huge wave came and the boat rode on top and came down, so much water came in. We were busy emptying the water manually. The entire hour back was so very tense it really had each one of us praying for our miserable souls. Going to this remote rock in the middle of nowhere for operating the radio — such a stupid idea, we thought.

Land at last — 70 minutes seemed like eternity. The boat owners had assembled on the shore. They were really worried, as it was almost 4 hours later than expected. Besides it was also beginning to get dark. They all wore that "I told you so" look. We had made it back — safe and sound and in one piece.

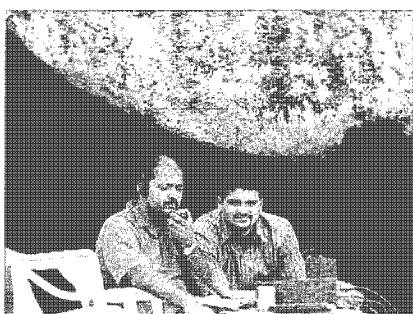
The van loading took us an additional hour. We quickly had some food in the village nearby, and set off. We decided to just all pack in the van, even when it meant some people had to sit on someone else's lap. The driver who had waited on the shore for the previous two days was probably dying of boredom. He drove really fast and



*Photo T. Sunset time — Sri VU2SBJ, setting up the longwire antenna while SWL Laxminidhi (injured) looks on.*



*Photo U. YL Su VU2RDJ tries to cook a meal at the camp kitchen.*



*Photo V. SWL Adarsh (right) watches while Sri VU2SBJ (left) operates Station 3.*

we reached Mangalore at about half past midnight (local time) on the 28th.

Some of us from Manipal had to travel another hour to get back home. Just had a shower and hit the sack. A busy day at work lay ahead for each of us.

The entire experience of the Sacrifice Rock IOTA was absolutely thrilling and satisfying. Though some of the trying moments made us think otherwise for some time, we asked ourselves if we wanted one more of such events.

*Continued on page 56*



# Hamfest Success Formula

*How to make sure your 'fest is a success.*

*So much has happened to the electronic industry and the hobby of amateur radio in the last 25 years of the almost 50 since my first hamfest.*

During that time, I have been a spectator, retail exhibitor, manufacturer, flea market seller, and even a hamfest committee member. Probably the questions most asked by the hams, the flea market sponsors, the exhibitors, and especially the hamfest committee are, "What makes a good hamfest?" and "What can be done to make it even better?"

Here are some very simple answers to the first question.

As a spectator, finding something you wanted at the price you wanted made it a success for you. As a seller who goes home with a lot less inventory than what you came with, and a pocket full of money, success is yours also. Commercial vendors and manufacturers who sell a lot of product have their measure of success. It is all quite simple! The real trick is to make it all happen.

Without pulling any punches, telling it like it is, many hamfests fall by the wayside. Everyone is excited and enthusiastic in the beginning, but some volunteers find it more work than they wanted while some stick it out and just plain become burned out.

I have attended most of the major hamfests in the United States, Hawaii,

Europe, and Asia. I was one of the hams on the committee that started Radio Expo in Chicago in 1971, the ONLY hamfest, in the world that has had Robot, Hewlett Packard, Standard, Antenna Specialists, Dycom, CBS Radio, Motorola, National Computer, Robyn, Swan, RCA, Sentry Crystal, Regency, Clegg, Hal Devices, ARRL, *Ham Radio Magazine*, *73 Magazine*, *CQ Magazine*, *RPT Magazine*, Midland Radio, Lafayette, Hallicrafters, Hy-Gain, Galaxy, E.F. Johnson, Avanti, S9, Alpha Seventy, Signetics, U.S. Navy Training School, General Electric Radio, U.S. Coast Guard, and many more, all at the same time — though unfortunately many of these folks are now long gone. Not even Dayton has ever accomplished that many luminaries at one time.

A club that runs a local hamfest gives a very nice pocket daily diary to each of its members and also to each commercial vendor who attends the hamfest. Recently a major vendor did not receive the pocket diary. They told me how they had looked forward to getting one and were disappointed that they did not get one. When I told the club president, he immediately had one sent to the vendor in a plain envelope,

did not call him as I suggested, did not put a note in the envelope with an apology for overlooking them, and did not thank the vendor for showing an interest in the small gesture of appreciation. Later when I spoke to the vendor, they told me of the cold and impersonal mailing, obviously disappointed in the brusque way it was done. A marvelous opportunity was missed to engender some real goodwill, and probably some ill will was fostered. Often it is the little things like this that can make or break an excellent relationship with vendors and in turn spell your success or failure in the hamfest.

While the hamfest committee is basically responsible for making it happen, it is largely a thankless job. As a club member, give them all the support you can and then some! A hamfest MUST be run as a business. If you are incapable of doing that, as many of us are, or if you don't have the time or desire to do it, well, then don't volunteer to be on the committee. Volunteer for one of the other jobs involved in running a hamfest, like setting up tables, chairs, helping with parking, or one of the endless list of things that need to be done to have a successful hamfest.



With today's free telephone calls allowed to many subscribers or the inexpensive 3- to 10-cents-a-minute long distance charges for others, it is not an expensive thing to do to make a few calls for the committee, and it can be a great big help to them. Here's another thing to do after the hamfest. No longer than 30 days after, send a thank-you letter to all of the commercial exhibitors ... the Alincos, Icoms, Kenwoods, and Yaesu. Send thank-you letters to the dealers and to everyone who bought booth space. Possibly include the registered flea marketers — especially if they BOUGHT table space. A short telephone call a few weeks after that for follow-up might ask what they liked and what you could do to make it a better affair for them next time. When making such calls, be sure they have a business flavor, be tactful, be a good listener, and above all do not prolong the call— be respectful of the value of the other person's time. Everyone enjoys a little personal attention, and most will welcome the opportunity to give their comments or complaints about the show. Be sure to thank them for their time and, finally, try to get a commitment for next year's hamfest. Then a few months later make a follow-up call, again using members with free phone privileges. By spreading out the effort, you will give members a sense of involvement without being too demanding of their time and money. Make sure you pick the people who make the calls VERY CAREFULLY. Try to use the brightest crayons in the box to do this for the club.

Consider offering a prize for the "BEST" commercial display. Maybe for the size or inventory. Maybe for having the most visitors. Maybe for having the best HAM and NONHAM information to pass out, verbally and on paper. Maybe for the most exciting booth for "NONHAMS" ... let's not forget them. Maybe for being especially helpful to youngsters. The prize might be a free booth the following year, or a discount, or an award plaque.

A comment here for flea marketers! A little soap and water, a wiping or dusting rag, and a little elbow grease

please! Clean equipment ALWAYS sells better and for more money.

Ladies' programs seem to be forgotten lately. We found out many years ago that more OMs would show up at hamfests if the YLs had something to do or see. Hundreds of YLs would show up for the Tupperware, Avon, etc., seminars and demos. How many of you have stayed at home on a hamfest weekend because the YL wanted to be with you and had no interest in the hamfest? A ladies' program might make the difference.

How about an incentive to any ham bringing a "nonham," getting a free admission for his friend. While hams are not cheap, hi hi, they might bring in more guests, for the right incentive. This could work towards doubling the attendance to the show and exposing a lot of new folks to the hobby.

How about a buffet dinner and open bar for the first hour on Saturday night, for the vendors and committee only? An excellent way to get to know the vendors and their likes and dislikes. Then, after the first hour, open the party to everyone on a cash basis. The profits from the general crowd will help defray the costs for the free party. The general crowd will be able to mingle and talk to the vendors in a more relaxed atmosphere and environment. Be prepared to hear comments from some of the vendors about being

tired after traveling, maybe all night or all day, and then setting up their booths and standing all day long, and be understanding. Think about questions that may be asked and have the answers in advance.

Every hamfest needs to have an interactive Elmer booth. You should have at least one demo going on at all hours of the show. It can be anything from kit building, APRS demo, building an antenna, ATV demo, to filling out a QSL card. Get members of the club to help who have favorite specialties. Not only newcomers, but other members of the club can learn from this booth.

Vendors sometimes attend with a minimum size crew and if business is good, it might be difficult for them to get away for coffee, doughnuts, lunch, potty breaks, etc. Some years ago I suggested using Boy Scouts, Girl Scouts, CAP cadets, etc., as help for the vendors, to watch the booth for a few minutes, run for coffee, get a sandwich, etc. If your event is in a facility that wants no outside food or drinks brought in, use this to your advantage. Ask them to provide this service for you. They make a little extra money, and you are not burdened with this detail. You might even be able to strike a good deal with them for catering your Saturday night buffet. Caution the young volunteers not to interfere

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with the vendors' activities and to only respond to requests for assistance.

If you have access to a large electronic billboard next to a major expressway, advertise the event a month or two beforehand. Have a radio personality plug your hamfest. Allow the radio station to set up a booth at the hamfest at no cost to the club. Many amateur radio clubs have members who are in these various fields who can be called upon to help. Arm your publicity committee with enough good PR information to make it easy for these folks to provide you with the publicity. Publicize the public service your club provides in your advertising.

Make sure your event is well advertised in the ham magazines and other ham publications. Get listed in the "Events Calendar." Drop off flyers at your local Radio Shack and electronics parts stores, but make sure you ask permission first. Use your Web site to advertise the event, and be sure your Web site is updated and carries no information that would detract from the positive image of a viable club.

Be sure your club members who attend other hamfests are well supplied with your flyers to make them available at those hamfests.

One of the toughest problems that especially new, start-up hamfests are faced with is picking a date and explaining to thousands of people why your date conflicts with another hamfest or event. In many areas you can find a hamfest within an hour or two drive EVERY weekend throughout the summer and sometimes into the wintertime. Here's what to do. If you want your event to take place in July and you know of a good site, a fairground, a coliseum, a convention center, etc., send a committee to check out the prices and availability of space for July. If you find out that the best time for your event is already taken, use it to your advantage. See if you can join forces with them and hold both events at the same time at the same location. If the hobbies are compatible, this is an excellent way to introduce a whole new group of one hobby to the other. You might even join forces with another ham club. By doing so,

you effectively double your available workforce. One BIG plus to this is that now you may have THE NUMBERS, that major vendors and magazine publishers look at to attract them to your event.

A trap that new start-up hamfests should not fall into is for eager people that want to start another Dayton. Most of the time they lack the experience and or background to do it RIGHT. A NATIONAL convention held some 25 years ago, involved a club that had not run a national convention for more than 5 years. Many of the older members who were involved in the prior event were not available. The remaining very-well-meaning and eager members who decided to "PUT ON THE SHOW" had little or no CURRENT experience. But even so, sometimes things that worked 5 to 10 years before simply don't fly today, although experience is a GREAT teacher. Making the hours longer is not attractive to exhibitors. Especially on hard floors. So place carpets in booths even if they are a gaudy color. Exhibitors will appreciate it. These carpet pads are available from local carpet stores, which will often give them away. These pads will also make nice pads to put between items so they don't get scratched in transit. You might want to provide several for yourself and other people manning the booth.

Now here is something that should interest all of you: making more money for the club and cutting down on the financial exposure. Start by planning the purchase of the major door prizes. Pick a dollar amount you think is reasonable. Buy the prizes or make a commitment to buy them. Put the word out as to what you are going to be giving away at your event and be sure everything goes as planned.

Maybe you had a good turn out at last year's hamfest and you expect the same or better this year. But MURPHY strikes. It rains, it snows, or you have 60 mph winds forecast or it's 110 degrees in the shade. Less than one half of the last year's attendance shows up. You have spent or committed your "wad" on the door prizes. You don't take in enough money to pay some of

the other expenses you occurred. Where do we go from here?

How about if the committee had decided to commit to only "one" major door prize. Or if the club states in their flyers that a certain percentage of the gate receipts will be spent on door prizes. The flyer can even state that the more attendees who show up, the more door prizes there will be. By doing this, you have held your up-front exposure and expenses to a minimum. If you have a good accounting system in place, you know what advance monies have come in and how much is committed.

Now comes a good part! You notify all your prospective vendors that all door prizes will be purchased from vendors that attend your event and that special mention will be made for that vendor. One hamfest that I know of in the West keeps an hourly account of the gate receipts as they come in. They take the agreed percentage of the gate around the floor and continue to buy from as many of the attending vendors as possible after getting some feedback as to what items might make the best door prizes. The first year they did this they spent more than twice the amount they spent the year before on door prizes, and had a lot more money left for the club also. Remember, you are only spending a percentage of the gate receipts.

This only scratches the surface of a very complex issue. I hope that I have given you food for thought and caused you to rethink some of the things you may be doing now. All of these ideas may not work all of the time. Ideas that did work years ago in one area may not work there again, but might work in another area or at another time.

This is a collection of thoughts and ideas and experiences that I have been exposed to over many years. Giving credit to all of the people who have added thoughts and ideas for this article over the years would be impossible. But thanks very much for your input and thoughts over those many years. If anyone reading this gets just one good idea or constructive thought to use, this effort will have been more than worthwhile.



# CALENDAR EVENTS

*Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the March issue, we should receive it by December 31. Provide a clear, concise summary of the essential details about your Calendar Event.*

## JAN 11

**GREENWOOD, SC** The Greenwood ARS 2003 Hamfest will be held at Greenwood Civic Center, January 11th, 2003. Contact **W4JAK**, President, **GARS**, 106 Dorchester Dr., Greenwood SC 29646, for further information.

## JAN 26

**NEW PHILADELPHIA, OH** The Tusco ARC Hamfest will be held at New Towne Mall, 400 Mill Ave. SE, New Philadelphia OH, Sunday, January 26th 8 a.m. to 2:30 p.m. Setup is at 6 a.m. Admission is a \$4 donation at the door, dealers admitted at no charge. Tables \$11 each. Food will be available on site and starting

at 7 a.m. at the restaurant next door. Directions: Exit 81 off I-77 to SR 250 East to SR 416 Exit. At end of ramp, turn left at light (under SR 250 bridge), then turn right at the first light. New Towne Mall is on the left. Talk-in on 146.730(-). Free parking available at the mall. Dealers welcome. ARRL/VEC sponsored exams by appointment. For additional info and to reserve tables, contact **Gary Green KB8WFN**, 32210 Norris Rd., Tippecanoe OH 44699. Phone 740-922-4454; or E-mail [kb8wfn@tusco.net]. Reservations must be paid in advance and received by January 20th to insure the return of reservation confirmation. Remember to enclose an SASE. Make checks payable to Tusco Amateur Radio Club.

## SPECIAL EVENTS, ETC.

### DEC 14, 15

**WICHITA, KS** Special Event Station W0SOE will be on the air from the Kansas Aviation Museum in Wichita KS from 13:00Z December 14th to 23:00Z December 15th, to celebrate the 70th birthday of WARC, and the official opening of the Club station in the old municipal airport building. Listen on or near the frequencies of 7.270, 14.270, 21.370 and 28.320 MHz. A certificate will be available for confirmed contacts. Send an SASE to **Bob N4BM**, 12135 W. Lynndale, Wichita KS 67235. For more details, visit the club Web site at [http://www.warc1.org]. 73

## NEVER SAY DIE

*continued from page 8*

lived entirely separately and cooperated to close down any Fijian who dared to start a competitive business. In other countries it was the Chinese who were hated ... for the same reason.

The situation in Germany in the 1930s was similar, with the Jews protecting each other in business in the same way. This made it easy for Hitler to use the German hatred of the Jews as a way to build his power.

When I was young any major American business wouldn't consider hiring a Catholic or a Jew. Just as most hotels were closed to blacks until fairly recently, many of the hotels in the 1930s were "restricted." That meant no Jews permitted.

I remember when I started my first business in 1951 to make loudspeaker enclosures. The office was a desk in my bedroom in my folks' house in Brooklyn and my first employee was Jordan Polly K2AZL. My father was aghast. He's ... he's ... he's a Jew!

In the past, immigrating groups at first kept together in enclaves, but by the second generation the integration of the Irish, Italians, Germans, Poles, and other Europeans had turned most immigrant families into Americans.

The color difference has made black-white integration much more difficult.

Ditto the brown-white integration. But, maybe a few more generations will solve most of our ethnic conflicts.

When I was in college sixty years ago, we had a few Hispanics, one black, and a few Jews. The Jews had their own fraternity and didn't mix with the rest of the students. The black was in several of my classes and it never occurred to any of us to think of him as anything but just another student. The Hispanics didn't keep separate either. I remember often bringing a classmate from Bolivia to my ham station so he could talk with his family in Cochabamba via CPSEA (I still remember the ham's call).

The more ethnic groups stick together and avoid speaking English, the longer integration is going to take. The longer they hold onto being Mexican-Americans instead of Americans, the more problems they're going to have enjoying the benefits of being American.

The blacks have done it to themselves by insisting on being African-Americans instead of Americans. Note that "African" comes first. Yet I doubt that you'll be able to find any American blacks with the slightest interest in living in any of the African countries. I've only visited ten African countries so far, but I sure wouldn't want to have to live in any of them.

When an Irish-American man marries an Italian-American woman, are their children Irish-Italian-Americans? No, they're Americans. Period.

Hmm, so how about the Chinese? I haven't seen any sign of them making any effort to integrate. Our local Chinese restaurant has been run by a different Chinese family every couple of years, with none of them making any effort to learn English except the waiter ... and then just enough to deal with customers. What master organization is setting up these thousands of Chinese restaurants? Where are they getting the families to run them? Who suddenly moves one family out and another in overnight? Are we being infiltrated with "sleepers" in preparation for an eventual war with China? Every little town in New Hampshire has one or two Chinese restaurants. Is it the same where you live?

## Our Schools

Have you ever wondered why our public school system is so bad, and why it's getting worse? As usual, just follow the money.

The teacher unions, which have well-heeled lobbyists in Washington and in every state capital, have a huge vested interest in things not changing (except for the government spending more money), and they're willing to spend whatever it takes to make sure nothing really changes.

Then there's the government. It's run by three groups — Congress, the

*Continued on page 57*



## Microwave Frequency Meters

*Frequency meters and Christmas time. I hope you have a counter in your Christmas stocking this year. If you don't, here are some of my suggestions for your next Christmas wish list.*

All of the mentioned frequency counters I currently have or have used on my workbench. Hope you too can locate one of these fine frequency counters in surplus at a reasonable cost for your workbench.

Just the mention of the frequency counter topic brings memories of my first frequency meter for which I barely remember the part number. If I remember correctly, it was an HP-523 mainframe about one half the size of a bale of hay and accepting a plug-in to extend its mainframe frequency range from 10 MHz to the outrageous upper frequency of 500 MHz.

It weighed a ton, seemed like maybe 50 to 75 pounds as I remember. I could check carefully after a 2-hour warm-up (great on a cold night from all the tubes inside) and measure my 2-meter crystal-controlled HT. All 2 channels narrow band FM. To this day I don't remember if the HP-523 relays or the blower fan produced more noise, but it was a great shack warmer. This was in the late '60s to early '70s. I should have kept that frequency counter, as it would be a great museum piece now.

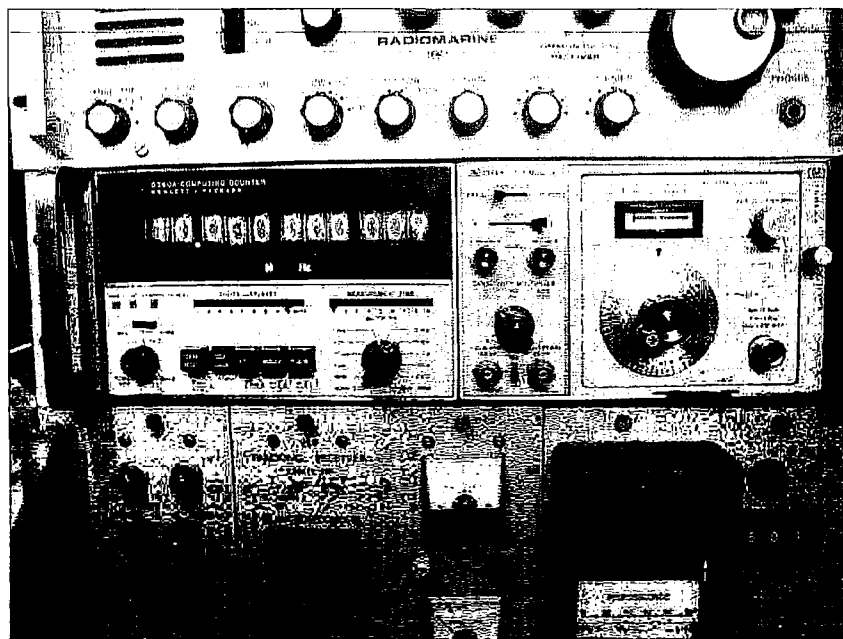
Today if we can't measure our microwave 10 GHz frequency hopefully to less than

1 kHz accuracy, it's not doing well at all (from a microwaver point of view). Without knowing where we are located as to our operational frequency on microwave, it would be disastrous. I would compare operations to trying to fish in murky waters where you have no clue where the fish are and just hope one swims by for the bait. At least when you know where you are tuned to for operations as to frequency, it eliminates one wobble in the cog on your wagon. In **Photo A** the VLF receiver located below the HP5360 counter was used to keep the main counter time base reference accurate comparing it to WWVB on 60 kHz. Now I use a Trimble GPS receiver tracking 10 satellites and making frequency reference measurements to parts in ten to the twelfth to ensure frequency meter accuracy. But that is another story for another column.

Other wobbles to minimize for good success at microwave operations are system sensitivity, transmitter power output, good SWR match to the antenna, proper pointing of the antenna system, liaison talk channels, and plain old good propagation for contacts. All necessary objectives, but if you cannot verify frequency, you're swatting at flies in a dark room blindfolded

There are many variations of counters and different attributes to choose from in both swap meets and auctions like eBay. The nice thing about frequency counters is that they are such a prolific device, used in almost every commercial shop, making them about as plentiful as the Pentax camera mount lens. To a very large extent they are available in surplus in great quantity. The counters I am to describe are not the only ones available but rather what I have been able to find and have on my workbench.

In my shack on the workbench I have the old workhorse HP-5245, whose mainframe is good to 50 MHz and frequency



**Photo A.** HP-5360 computing counter, basic 300 MHz mainframe and good to 18 GHz with associated plugs. Can use the same plug-ins as the HP-5245 counter but requires an HP-10536A to adapt the physically smaller 5245 plug-ins to the larger HP-5360 mainframe. This HP-5360 counter is shown between an old Drake R7 monitor receiver and a 60 kHz VLF tracking receiver for time and frequency accuracy comparisons to WWVB at 60 kHz. This frequency counter is capable of reading accuracy of a few millihertz. Shown in picture is 10 MHz measurement to 9 decimal points or 9 MHz accuracy.



is extended to 18 GHz with appropriate plug-ins. The time base is not bad but I rate it fair, accurate to about 1 part in 10 to the 6th or 7th over a short run. Not bad for a workhorse and an inexpensive counter that's quite available.

With the time base running off a station master frequency 1 MHz clock (AN URQ-10A), the time base clock is less than 10 millihertz, improving accuracy due to external frequency reference. Plug-ins that are available are the 5257-A, which acts as a transfer oscillator and converts input RF to 50 MHz mainframe from any frequency in the 50 MHz to 18 GHz input range. There are other HP (Hewlett Packard) plug-ins available that will function from 150 MHz to 3 GHz (5254C), and the 5255A plug-in from 3 to 12.4 GHz. Still a very handy counter selling for \$5 to \$40 at swap meets, with the frequency counter plug-ins for slightly more. Have seen the 5256A, an 8 GHz to 18 GHz PIU, go for \$65 each, working of course.

An update of the HP-5245 is the HP-5248L, which is good to 150 MHz directly and has a better time base oscillator than its brother the HP-5245. Externally, it looks identical to the HP-5245; you have to read the counter label to know the difference. Both counters accept the same brand of plug-ins. The 5248 counter is a little harder to find on the surplus market but still somewhat available, selling for \$40 to \$75 for the mainframe counter — sometimes with an orphaned plug-in unit.

Getting into specialty counters are the HP-5360-A computing counter which has three input ports, DC to 10 MHz, 1 kHz to 300 MHz, and a plug-in of your choice, using the same plug-ins as the HP-5245 counter. To do so requires a plug-in drawer adapter HP-10536A. The 5245 PIUs are smaller than the opening on the 5360 so the adapter unit must be used or else use the very expensive 5345 plug-in units. Another pricey counter. Similar but not exact. The 5345 will function to 18 GHz as the 5360, but the difference is that the 5360-A will do Boolean algebra using all three of its RF input ports. It uses all three ports to calculate exact frequencies, sampling IF strips, local oscillators and such, and RF conversion LOs all at the same time, and almost tell you which one is off frequency, and how to reset it. The 5360A is also a very fast counter and can do period sampling at RF. One flick of the quickest finger on the PTT switch, be it 2 meters or 1296, and it counts it to a hertz if asked to perform. It's a speedster. Time base just as good as my URQ-10A, which is under 10 millihertz accuracy at

clock frequency and very stable for long periods of time. Surplus cost in the \$100 to \$200 range or more when working and \$40 when broken, mainly because it has a handwrapped motherboard, a real TTL giant to trouble shoot. A giga bunch of ICs, if not a thousand. I would pick up a dead HP-5360 just for the master time base oscillator to use as a great reference.

Then comes in surplus the HP-5328A counter good to 500 MHz, very good for low frequency work and I believe not too long removed from HP catalogs as a sale item. It's capable of period and frequency measurements to 1 part in 10 to the 8th and reasonably fast in operation. Cost on the surplus market is about \$75 to \$100, depending on condition and the gleam in the buyer's eye.

Now comes some real special toys — the EIP-451 microwave counter, which is an autohet counter from 300 MHz to 18 GHz. Autohet means no tuning, just plug and play, insert the frequency under test at proper level and there is your frequency displayed accurately to 10 kHz intervals. Its sensitivity frequency is from -10 to +10 dBm for input power. It's a very versatile fast counter, small profile, three inches high, 19-inch rack mount. Two inputs, 300 MHz to 950 MHz and 900 MHz to 18 GHz direct reading. Will not read down to a hertz but will tell you to 10 kHz accuracy points. Very good for quick bench confirmation work at microwave. Cost surplus \$150 and up, again depending on the gleam in the buyer's eye.

#### Photo B.

The companion counter in the Hewlett Packard arsenal is the HP-5340. This is a very nice top-of-the-line counter that is also autohet from DC to 18 GHz. It has a very accurate time base and is sensitive to about minus 20 to near 30 dB on RF to 18 GHz. Will read frequency to 1 hertz accuracy or slightly better if you want. Surplus cost is in the \$200 to \$300 each range, although I have heard of some going for \$100 at swap meets in the Los Angeles area. Don't know if working or not at that low price.

I have not had much experience with this 5340 HP counter as I have just acquired this unit to add it to the workbench test setup. It has been a unit I have looked forward to adding to the bench for some time. Is this a counter for all time (well, I hope), so it's the best unit I have been able to obtain for my microwave work on a meager budget. In the short time I have been using this counter, I have been very impressed with its speed, accuracy, and great low level sensitivity for measurements. Very impressed with this frequency counter. The

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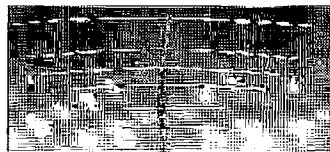
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only improvement would be if it could read frequency higher than 18 GHz to include our 24 GHz amateur band endeavors.

I have no plans to get rid of any of the previously mentioned counters, as they all serve a specific use on the workbench. The 5245 requires a plug-in that will give accurate readings from 3 to 12.4 GHz and is used for final LO adjustment of frequency sources. With the use of a plug-in, it is accurate but requires setting the final frequency to be read to within 50 MHz hash marks on the plug-in dial to obtain results. It is possible to be upside down in 50 MHz determination as it will be translated off frequency if you are not careful to read a higher 50 MHz increment.

For example, reading a frequency of 3456 MHz, it is possible to set the 50 MHz dial to 3450 and read 6 MHz on the mainframe counter. If going to the next higher 50 MHz increment of 3500, the counter will read upside down or 44 MHz, the inverse of 50 MHz - 6 MHz. You just have to be careful and make sure you are using the low side frequency not the high side product of this plug-in unit. Come up in frequency from the low frequency end of the plug-in expected frequency and you should have no trouble finding the proper frequency. This

little trick will eliminate your being tricked into using a high side mix product.

Same results for the computing counter (when using HP plug-in units) the HP-5360 will read correctly up to 300 MHz as it uses the mainframe basic counter and not the plug-in. I use the computing counter for making high accuracy frequency measurements, as I trust it to be accurate to less than 10 millihertz. That's reading a 10 MHz frequency and displaying the frequency to read 10,000,000,009 MHz accurately with sampling (clocking) going on every 100 milliseconds (tenths of a second). This counter is fast, accurate, and still working. Considering its age of 15 to 20 years, this is very remarkable for the quality HP put into these counters.

I have 3 other 5360s that don't work due to troubles and old age. Kerry N6LZW and I have been using these hangar queens to maintain the working counters we have. I will be very unhappy when I lose the last working 5360 I have; it has been a pleasure to use it to sample TCXOs for proper operation to a very fine resolution in frequency quickly. The HP-5328A is the backup counter for this operation. It will display a 10 MHz frequency to 7 decimal places. I guess I am somewhat crazy in that if one is

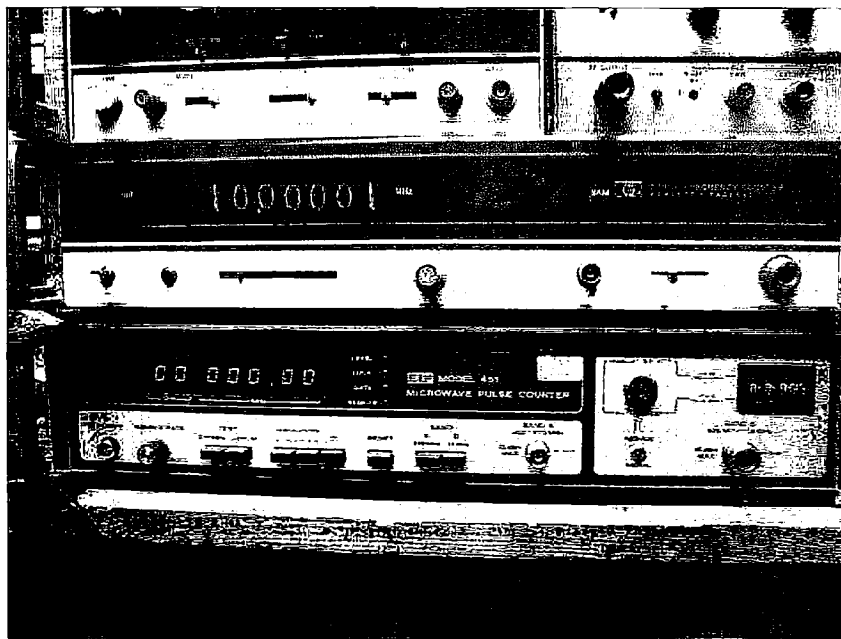
good, a backup is essential, at least if you don't want to be stuck with repairing equipment part of the time. Also it's not a bad idea for you to collect broken instruments inexpensively for a source of parts to keep your good stuff running and a source for knobs and source for specialized parts particular to the unit you are using. We have come to call these parts devices "Hangar Queens," giving us the ability of parts robbing on a defunct unit.

I broke several knobs on my 8620 HP sweeper mainframe over years of use, and HP wanted over \$35 per knob. I was able to purchase a defunct HP-8620A broken but with a good set of knobs for \$25. I did not even turn it on to see if it worked as all I wanted was the set of knobs. On a lark I fired the new junker up with my plug inserted and it worked better than my mainframe. I deposited my old mainframe in the working-but-spare hangar queen depository. Yes, you must have some space to store all this stuff, but then it's only a hobby and the stuff is not stored under the couch in the living room. Got to keep some of these things in perspective. Anybody need some HP plug-ins? I have too many in storage for 200 to 3 GHz and 8 to 18 GHz — what was I thinking at those swap meets? I guess that if one is good then two or three are even better!

As to the EIP-451, it's a quick counter to verify things are functioning as well as expected, and it is the workbench quick answer to many frequency-related questions. It has limitations, as do all things — one being in that it will not read below 300 MHz at all, and resolution is only good to 10 kHz steps. If that is a problem then it's not a counter for you. I personally love it and highly recommend it.

If reading below 300 MHz is a problem, get a plastic handheld counter like the Digimax or many other handheld counters. I have two of them, one that functions to 500 MHz and another that reads to 1.2 GHz. Keeping charged batteries in these units has become a problem and they're not used very often; however, they're still on the workbench and work when the batteries are on speaking terms with me. If this is not suitable, then save up and find an HP5340. It will be accurate, fast, and reads from DC to 18 GHz. All you have to do is not purchase that new HT you have been ogling and go to swap meets and find a 5340 in working order, then join in on the fun with a top-line counter for amateur microwave work.

Well, that's all the damage I can cause



**Photo B.** EIP-451 mainframe has two frequency inputs. Input #1, 300 to 950 MHz, and input #2, 900 MHz to 18 GHz. The counter displays frequency in autohet fashion in 10 kHz steps finest resolution. The EIP counter is locked in on my workbench perched just below my HP-8620 sweeper that has similar capabilities as the EIP counter, two to eighteen GHz operations. Just above the EIP-451 is my new HP-5340 frequency counter, also autohet, with higher minimum input sensitivity, greater than anything I have had before. Input sensitivity is about minus 30 dB input and good from 1 MHz to 18 GHz. A real find and something every microwave enthusiast should have on their Christmas list.

Continued on page 56



### Dear Santa,

Without making any claims about how good I have or have not been, I'm sending you my Christmas list. I don't want to sound greedy, but the list is a bit longer than normal this year. You have always seemed pretty creative, and this year you may have to issue extra thinking caps for the elves. Unfortunately, many of the items on my list have not been invented yet.

For my emergency support work, I'll need a few things. Usually I ask you for extra battery packs for the HT. This year, how about a battery system that uses interchangeable batteries like the battery packs that can be used in electric drills and other power tools? Different radios would have adapters to allow the appropriate number of these interchangeable batteries to be used. You could even use different numbers of cells for high power or low power transmitter outputs. They could be used for everything from handie-talkies to emergency lights to laptops. In fact, in the event of an emergency I could pull the batteries from the power tools and put them with the ham gear.

With such a high importance on emergency communications, a clear identity for amateur radio operators that would be recognized by Homeland Security and local public officials would be great. This could be used for everything from ID cards to identifying vehicles used for support operations. ARES and RACES cards are good if you want to be greeted with a blank stare, so coming up with something better shouldn't be too hard. Maybe Homeland Security could provide cards that would identify hams as similar to the old Civil Defense volunteers.

I'd also like a good all-band antenna that can be erected quickly. In fact, for the high winds in Wyoming, one that erected itself and could be retracted in high wind would be perfect. I'm sure that the folks along the Atlantic and Gulf Coasts would appreciate such a device during hurricane season. Ideally it could be retracted into a position that did not present a hazard to others.

For portable operations, why not send a selection of antennas. I've always thought that hams should have an antenna bag

comparable to a golf bag. It would have small flexible antennas, mid-sized antennas and the big dogs. You could have an antenna bag for each radio. I can almost hear a ham deciding which antenna to use. "Hmmm. This is a difficult position, I guess I'll have to use the 5/8 wave."

Speaking of antennas, how about a nice mobile antenna that covers 10 meters and up that can be driven into a commercial parking garage without hitting the overhead obstructions? And while you're at it, I've been dreaming of a durable antenna mount that can be used on today's alloy and plastic cars. Something that doesn't use magnets, doesn't require drilling visible holes in the auto body and doesn't fear plastic bumpers. Maybe a double screwdriver antenna. Have one switch to tune the antenna and another to retract it before pulling into the low overhead parking deck.

As you know, Santa, I do a lot of my ham radio operating from the car, so naturally I am as interested in what goes into the car as well as what goes on it. I'd really like to take advantage of some of the technology that has become commonplace in the last few years. I like the detachable control heads that are becoming commonplace, but we need to go a step or two further. Ideally, a clear LCD display could be mounted on the top of the dashboard as a heads-up-display. You could see the necessary information and yet not have it obstruct your view of the road. Add a few LEDs at the edge and you could even use it at night.

If I can't have my heads-up-display, then can the control heads be made a little thinner or otherwise designed so that they can be mounted by Velcro® to the dashboard with no loss of functionality? There's got to be some good way to mount a radio in today's cars without a lot of hassle. Putting the main portion of the radio under the seat works well, just a little more ingenuity for the controls would make it significantly better.

I can program one of my mobile radios by connecting it to my laptop computer with a serial cable. What I'd like to do to transfer the same information using the infrared

feature on my laptop or PDA. Imagine how handy it would be to keep the repeater frequencies for various cities stored in the pocket computer. Press the beam button and those would be transferred to the radio. Travel to a different city and you could reprogram your radio with no hassle.

On a smaller scale, I'd really like a new handie-talkie case. The ideal case would be easily attached to the belt without having to unbuckle the belt, perhaps using a durable belt clip or a heavy-duty Velcro strap. It would be well padded and provide protection from rain. Finally, it would be designed so that the connection of earphones, microphones, etc., could occur within the case without breaking the plugs or stressing the radio. It would be easy to remove the radio from the case or the radio and case together, but would never, ever fall off.

Santa, there are several things I've been wishing for, for many years. I'd love a good reason to get into 1.2 GHz. There's just some kind of cachet about that frequency, but I haven't been convinced to make the jump, yet. And another thing, I haven't seen a significant change in repeaters in 20 years. The same computer-generated voice has been heard IDing repeaters from coast to coast since I first got my license. Maybe this year we could go digital or something? I'd really like to see something different — in fact anything different. Two meters used to be exciting, but now that we all have cell phones, it's kind of losing ground.

ATV has always fascinated me, but has been a bit costly. Can you leave me a book that tells me how to use low-cost components and software that would use my existing 440 MHz equipment? Cameras that mount on top of computers are relatively inexpensive. Could one of these be used?

I love APRS, and often run it from my car. Maybe you could leave a new APRS rig with a real video screen designed for mobile work under my Christmas tree. I like the features in mobile systems, but a screen display that is visible in a wide range of

*Continued on page 56*



## In Pursuit of Mode A

*Just when you think AMSAT-OSCAR-7 (AO-7) is permanently hung in Mode B (70 cm up and two meters down), it wakes up in Mode A (two meters up and 10 meters down). This was fine 22 years ago when most satellite chasers had excellent, or at least adequate 10-meter antennas, but it's not the case anymore. Most hamsat enthusiasts have gone on to VHF, UHF, and microwave antenna arrays.*

Since Pat Gowen G3IOR's discovery on June 20th of AO-7's rebirth, hundreds of hams around the world have been monitoring telemetry and making contacts through this amazing satellite. The last time AO-7 was heard was in 1981. When the internal batteries shorted out over 21 years ago, the satellite was given up for lost. Now, with the batteries in an open-circuit mode, the satellite has been operational whenever the solar panels are illuminated. Don't give up on a pass if nothing is heard when the satellite comes over the horizon. Many times, especially during late evening passes, AO-7 may be in darkness, and not yet transmitting. A significant problem is that when AO-7 finally turns on when fully illuminated, it comes up in a random fashion. It could be in Mode A, Mode B, Mode C (low-power version of Mode B), or Mode D (recharge). The 70-cm beacon may also come on when the satellite is in Mode A or Mode D.

Many potential operators are not set up

for quality Mode A reception. While the RS satellites from the USSR made use of 10 meters for their downlink for many modes, the signals were usually so strong that simple antennas would work. Dipoles and whips did well for all except RS-15, which is very difficult to hear, even with a good yagi. AO-7 can be heard and worked with simple antennas, but there are better alternatives.

Mode A on AO-7 actually works as well as Mode B or Mode C, if you have the right receive antenna. The Mode A transponder is wider than the Mode B system, and it is less susceptible to overload and the subsequent frequency shifting caused by strong uplink signals. There are also fewer strange signals in the passband and less chance of the satellite receiver having problems during the course of a pass. Mode A can be a lot of fun if you are ready for it.

### Mode A antennas

More is better. The best 10-meter antenna

for AO-7 reception would be a multi-element crossed yagi tuned to 29.450 MHz with azimuth and elevation control. If you live where there are no deed restrictions, go for it. Build a six-element crossed yagi (three elements vertical and three horizontal), set it for axial or circular polarization (right- or left-handed), and enjoy. You may also be able to make some rare RS-15 Mode A contacts. While you are at it, take some pictures and send them to me!

The next best AO-7 Mode A antenna is a vertically polarized three-element, 10-meter yagi mounted on your satellite-antenna boom. This assumes that your present satellite antenna array includes at least a VHF two-meter beam antenna and a 70-cm beam of similar size. If you have sufficient clearance for such a 10-meter beam, and a rotator system that will take the additional load, this arrangement will provide excellent results. Although there will be some fades when the satellite's 10-meter antenna is out of phase with yours, signals will be good

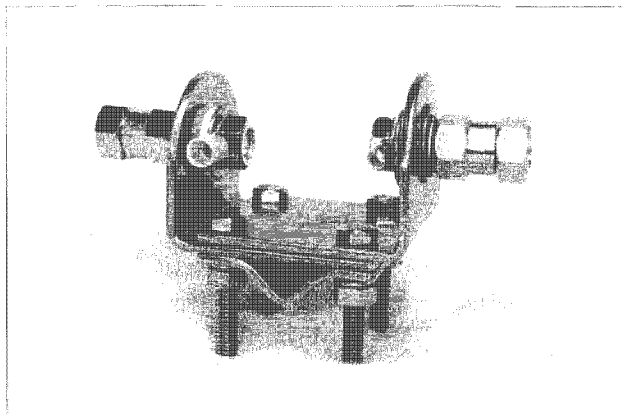


Photo A. The Texas Bugcatcher dipole adapter.

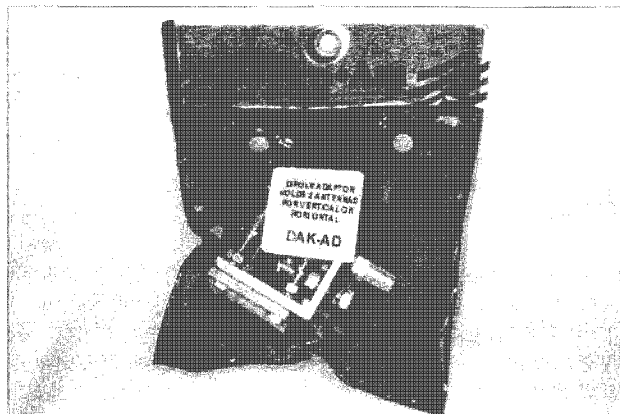


Photo B. The Pro-Am DAK-AD dipole adapter.



even at the horizon. There are a number of lightweight commercial 10-meter beams available, or you can build your own. It's not a significant project, but when you put it up, your neighbors will notice. Once again, take pictures!

Another yagi alternative is a horizontally polarized beam located below your hamsat antenna array. Mount the 10-meter beam just above the azimuth rotator. Place the elevation rotator far enough above the 10-meter beam to allow the two-meter, 70-cm, and other satellite antennas to rotate in elevation without hitting the 10-meter yagi. This will work on a tower where the azimuth rotator is in the upper tower section with a thrust bearing at the tower top just below the 10-meter yagi. It may also work with a sturdy azimuth rotator above the tower or top of a pole, when the usual satellite array does not have serious wind loading characteristics. Although the 10-meter yagi can only track azimuth with this system, it will provide excellent reception at the horizon and quite sufficient operation on high-elevation passes.

A good option worth considering is a vertically polarized dipole on the satellite-antenna boom. Like the vertically polarized yagi, it will need clearance for both azimuth and elevation rotation. If its presence does not invalidate deed restrictions and it fits, this arrangement will provide excellent results for most AO-7 passes. The driven element from an old 10-meter beam will work well, or you can design and build a decent dipole from aluminum tubing with direct or gamma-match feeds.

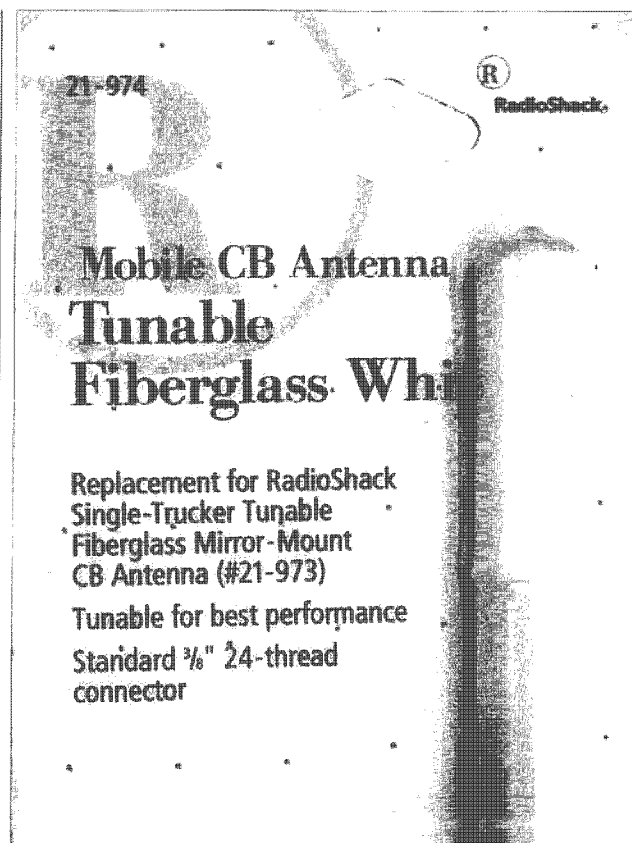
Another dipole option is a horizontally polarized version. Like the horizontally-polarized yagi, the best mounting arrangement is to place the dipole above the azimuth rotator, but below the elevation swing of the VHF and UHF antennas in the original satellite-antenna array. If the dipole is mounted close to the VHF/UHF antennas, it can be placed in-line with the booms of the VHF/UHF antennas to allow them to swing past the dipole or in-line with the satellite-antenna array boom. The latter condition will require that the array never be allowed to closely approach 90 degrees, where it will hit the dipole, unless the dipole can be offset a few feet in front of the vertical mast. Both options have their good and bad points. With the dipole in-line with the booms of the VHF/UHF antennas, the dipole will not be oriented for quality reception. With the dipole in-line with the VHF/UHF array boom, the possibility for an inadvertent collision during overhead passes is dangerous.

Low-end options are numerous. Hang a 10-meter dipole in the trees or use an existing outside 80-meter antenna. Connect to a longwire or use some other outside HF antenna. Verticals or horizontal loops are also viable options. The worst-case situation is to use an attic- or room-mounted antenna. If you have any computers in the house, anything in the attic or the radio room will pick up noise that can easily mask the downlink from AO-7. You may be able to log a contact or two, but it's not worth it. At least use something outside, and in the clear.

### The compromise

With multiple HF antennas in the attic and a few outside, Mode A via AO-7 at W5ACM was marginal. The 10-meter attic dipole had good reception, but computer and LAN noise was bad. The outside 80-meter inverted V was quiet, but didn't do well with the ever-changing position of AO-7 in the sky.

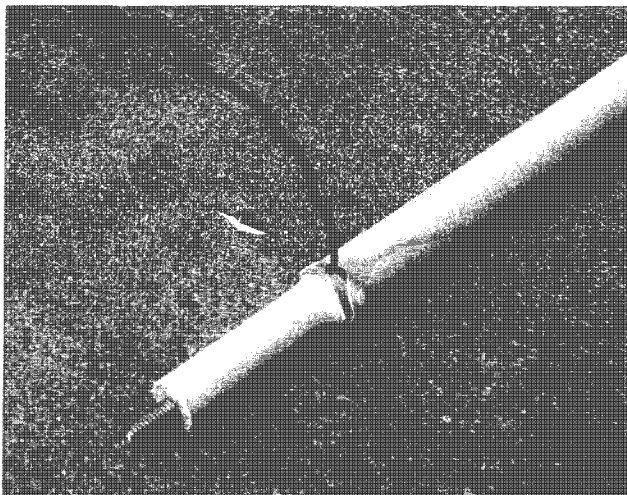
My satellite antenna array includes yagis on 23 cm, 70 cm, and two meters. A semi-dish with downconverter for 13-cm reception is sandwiched between the 23-cm and 70-cm yagis. There is even a 15-meter dipole under this array parallel to the yagi booms. It was getting crowded, and deed-restriction enforcement folks wouldn't appreciate any 10-meter beams.



*Photo C. A Radio Shack tunable whip CB antenna.*

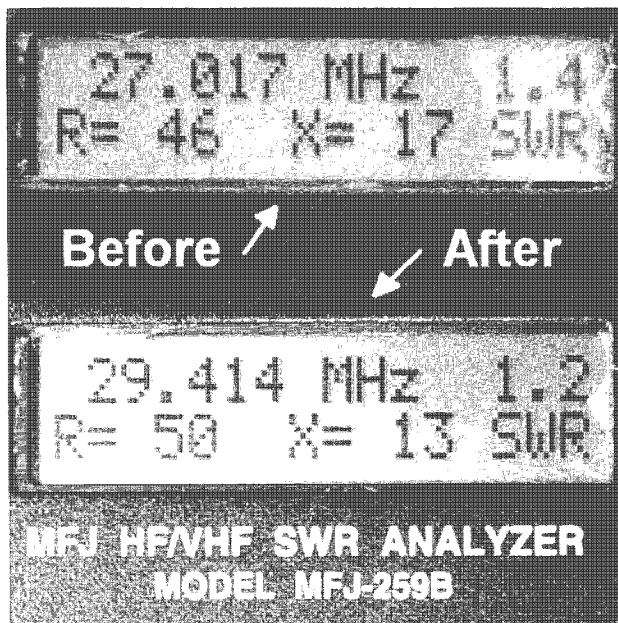
My second choice was a vertical dipole between the 70-cm yagi and the 13-cm semi-dish/downconverter. There was space on the solid fiberglass boom, but a full-size dipole was nearly 16 feet long. A shorter version was still too long to clear the roof. I needed an antenna that was no more than ten feet in total length.

Some preliminary Web searches turned up some possible loaded whips from Radio Shack and two adapter mounts for making a dipole using two mobile antennas with standard 3/8" x 24 threads. Sources for the dual-whip adapters included Pro-Am's DAK (lug



*Photo D. Removing part of the coil from the Radio Shack whip antenna.*

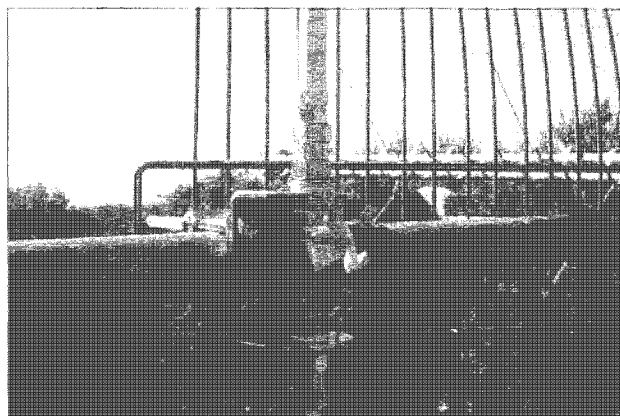




**Photo E.** Before and after tuning the Radio Shack antennas for the dipole.

connections) or DAK-AD (SO-239 connector) and a similar unit from the Texas Bugcatcher made from stainless steel using lug connectors for the coaxial cable. I also noted that the Pro-Am units were also available as Ironhorse Antenna products. After purchasing the Texas Bugcatcher unit and the Pro-Am DAK-AD, I opted for the stainless-steel unit, but discovered that the bolts were only long enough to attach the unit to a 1.125" boom, and my fiberglass boom was larger (1.25" diameter). The Pro-Am unit came with two sets of mounting bolts. Neither the long nor the short set was stainless, but at least I could get the Texas Bugcatcher adapter on the boom with the long bolts, now permanently borrowed from the Pro-Am unit. I'll worry about the rust later.

A tour of the local Radio Shack store turned up what looked like the perfect antennas for my new dipole. Although I had a list of possible antennas gleaned from (<http://www.radioshack.com>), the "Mobile CB Antenna — Tunable Fiberglass Whip," part number 21-974, appeared to be perfect, and at a bit under \$15 each, a pair of these four-foot-long, white, trucker CB whips looked like the answer.



**Photo F.** A close-up view of the dual-whip, now dipole, antenna mount.

## Testing and adjusting

Back at the house, the two CB antennas were screwed into the dipole adapter, mounted on a ten-foot wooden pole, attached to a short length of RG-58 coax and tested in the back yard. Resonance was found near 27 MHz using a MFJ-259B SWR analyzer. The tuning slugs in the ends of the shrink-tube-covered fiberglass antenna rods managed to move the resonant frequency only a few hundred kHz. I was hoping for more, but they are only designed for the 11-meter CB band. The tuning slugs were removed since they would be of little use for the nearly 2.5 MHz move to the top of the 10-meter ham band.

A slit was cut in the shrink tubing on both antennas to find the end of the wire used to make these top-loaded short whips. Pieces of wire were unwrapped and cut off in five-inch increments. After removing 30" of wire from both whips, I had finally reached the goal of resonance in the top of the ten-meter band. In fact, I had gone a bit past the desired target of 29.450 MHz — the center of AO-7's Mode A downlink. Another 1.5 inches of wire were unwrapped from the end of each coil and turned out straight along the fiberglass rods. This brought the resonant point to 29.414 MHz. Close enough. The excess fiberglass was cut off with a hacksaw, the shrink tubing trimmed, a little glue was added to keep the wires

*Continued on page 57*



**Photo G.** The finished short 10-meter dipole mounted between the 70-cm yagi and the 13-cm semi-dish/downconverter.



## Fun Time

*How about a little fun exercise today? Well, maybe some of us have a different definition of fun and games, but this appeared to be a challenge in the beginning and the more I played with it, the more rewarding (FUN) it became.*

I am speaking of getting the macros massaged in one of the less-spoken-of pieces of ham software. TrueTTY, available at [www.dxsoft.com/mitrtry.htm]. Of course, there is more to software than getting the macros to cooperate, but even the best program gives the feeling of a millstone when we have to do everything manually.

This is a really great package. Some of you have used it. I am sure, but I hear very few on-the-air reports of its usage, though I have heard users give glowing testimonials once they use it for any length of time. I think the real problem is it is different and has a feeling of complexity. It is shareware, rather than freeware, but the registration is only \$35 US.

Here are just a few items worth mention about the program. I first got a copy of this about two years ago and the improvements via revision have been coming in a steady stream. The author, Sergei UA9OSV, puts forth a real effort to develop a good package by making additions as hams have requested.

One of the first things you notice when you download this program is the fact it is so compact. Here is a multimode communication package for RTTY, BPSK31, AMTOR, and packet that is about 3/4 of a megabyte total when zipped. That speaks well for painstaking programming.

As the name suggests, the first thrust of the software is RTTY, and it is a whiz-bang, hard-to-beat program for that mode — very responsive and intuitive. The layout of the program display is not really foreign but departs from what we tend to think of as the “norm.” There is no waterfall. Instead, you tune with a very effective spectral display, which is definitive enough to give reports on signal quality even for BPSK without an IMD readout.

It won't be long after you begin the installation when you will hit the Help button. There is a neat, concise bit of documentation that I wanted to study a bit and so I printed it. Almost a surprise, the entire file covers four pages and tells everything you need to know except one little side trip click to the “macro-sequences” file that covers the codes you need to get your personal macros working. Short and to the point — I like that.

Once you are past the setup portion of the installation, which is fairly straightforward as soundcard software goes, you will want to get to the macros. The furnished macros are not ready to fly for your personal contacts. If I recall, the author of the program has his own info entered, and that has an advantage because it gives you a pattern to follow. I always welcome any hints the author leaves for me.

After a few years of using many digital soundcard programs I have devised a pattern that I follow. You will notice from the screenshot that the macro buttons are labeled, which helps me recall the pattern that slides easily from the little gray cells. That labeling technique I discovered almost by accident in this software. I had the edit display on the monitor and clicked on the “F1” designator box and the cursor “stuck” there, which meant I could edit it. That promptly became “CQ” instead of F1 and I was in the renaming business. Later, as I was reading the instructions, I found a sentence that I had breezed over earlier that said I could do just that little operation. If all else fails ...

You will learn quickly why writing these macros differs from most of the “plain language” macros. It is necessary to grasp the use of the various symbols and codes to make each macro work as you desire. The

nice thing is that you can test these macros with the rig off. You can watch the whole process, including “transmit”, “callsign”, “line feed”, and “receive” each time you make a change. As I mentioned earlier, this started as a challenge, then became a rewarding exercise.

You will notice in the screenshot there are two rows of macro buttons. I am getting to the point that I think I must have more than 10 or 12 macros. TrueTTY allows 36 macros. When you go down the Setup pull-down to View you will find the choice to display 1, 2, or 3 rows of macro buttons. They will work even if they are not displayed but that is a bit taxing on the gray cells. The second row requires use of the Ctrl key, or of course you can click any of them.

After getting all the aforementioned ducks in a row, I just had to make a few contacts. This is the last part of September when this is being written and the bands are beginning to sparkle with some DX and fairly good paths for closer range rag chewing. One of the first contacts was with a station in Poland on RTTY. That was a pleasant start.

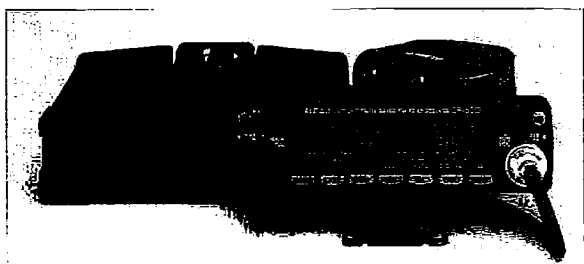
As I recall, the next was a stateside contact on PSK31. That went well enough. I could see this was going to be a success, so it was time to finish getting my act together and make provision for logging. Quite a few of you folks are insistent about my keeping records and sending you cards from Nevada, and I experiment a lot with log programs.

On the TrueTTY Web site (DXSoft) you will also find a truly excellent log program named AALog that is written by Alexander RZ4AG, especially to interface with TrueTTY. So I set about getting that

*Continued on page 50*



# NEW PRODUCTS



## NEW TWINBAND MOBILE TRANSCEIVER

Alinco has developed a new twinband mobile transceiver operating on the 2-meter and 70 cm bands. The new mobile has transmit coverage of 144.00 to 147.995/430.00 to 49.995 MHz. The receive coverage is 108.00 to 173.995/335.00 to 480.00 and 87.50 to 108 MHz (WFM).

Additional features include front control unit separation (optional EDS-9 kit required); advanced 10F3 digital mode with speech compression technology (EJ-47U required); 200 memory channels; and advanced EF-50U TNC (optional) and D-SUB9 connector that supports digi-peat mode for APRS tracking and 9600 bps packet. Remote control features including parameter setting and direct frequency entry through the microphone.

MSRP is \$481.95. See your local dealer or contact Alinco for more information at 937-473-2840.

## NEW DATAK 440 KHZ TO 185 MHZ PLL-VFO EXPERIMENTER'S KIT #80-1401

Claiming to have the most sophisticated VFO kit ever offered, the Datak Division of LKG Industries has announced a new product intended primarily for hams. The new VFO kit is PLL-controlled (phase-locked loop). The top board of this two-circuit board kit contains a keypad for entering the frequency, as well as the digital readout module. The bottom board contains the VFO with an area for the experimenter to add his own circuit, whether a receiver, transmitter, signal generator, etc.

Not intended to be a complete circuit, the kit is considered to be a platform for the builder to work from, adding just about any circuit that requires a precise frequency control circuit. Included are circuit ideas, including a two-watt 40 meter CW transmitter, a receiver circuit, and others.

The circuit operates on 12 volts DC and may draw up to 100 mA. Don't forget to add enough power supply capacity to run whatever circuit you might add as well, the maker reminds us.

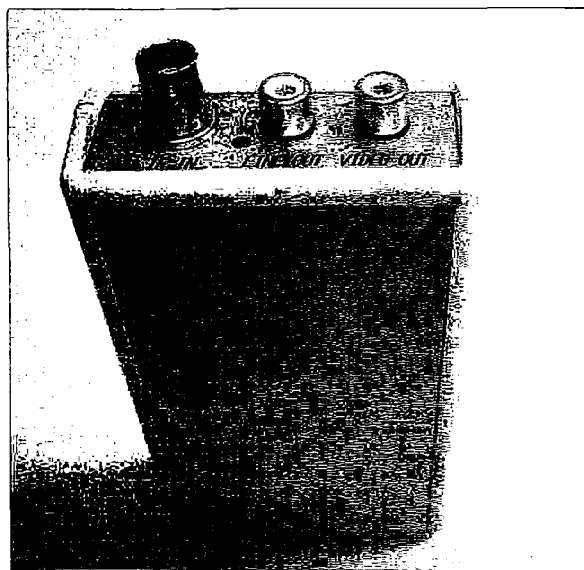
For further information, contact Datak at 800-645-2262.

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## AOR INTRODUCES TV-5000 SCANNER VIDEO CONVERTER

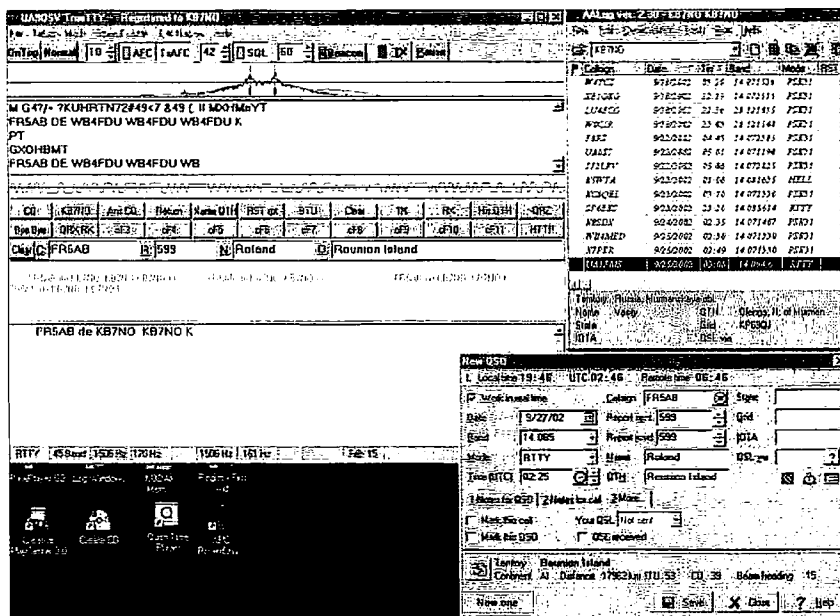
AOR USA has released the new TV-5000 Video Converter, an accessory that adds the ability to monitor NTSC video when using wide range receivers (such as the AR5000 or AR5000+3) that have wide-bandwidth 10.7 MHz IF outputs.

"The TV-5000 allows the user to monitor conventional NTSC broadcast transmissions but also adds the ability to observe interesting video outside the tuning range of most broadcast reception units. One may be able to view video used by public safety agencies including video downlinks from aircraft, Amateur Radio fast-scan TV, news media feeds, NTSC wireless video monitors and more," said Takashi "Taka" Nakayama KW6I, Executive Vice President of AOR's North American operations. "Video cameras are becoming more commonly used every day. The TV-5000 gives video monitoring capabilities to the owners of high-quality wide-range scanning receivers."

The TV-5000 is compact, easy to connect, operates on just two AA batteries (or a 12 VDC external power source), and provides NTSC video output to a TV monitor, along with line-level audio output. It connects to the 10.7 MHz IF output of a wide-range receiver via a shielded cable with two BNC connectors (cable is provided with the TV-5000). The operator then connects the video and audio output ports to the inputs of a monitor, using shielded cables with RCA-type connectors.

The TV-5000 is literally "plug and play" in that there are no settings or adjustments to make. The operation manual states that minor "fine tuning" of the receiver may be needed to optimize video reception, once a video signal is located. Depending on the observer's location and antenna system, it may be possible to observe video from satellites, in-car cameras, or any other of several NTSC video sources. The TV-5000 could also be used to monitor cameras in a wireless security system that uses NTSC video. "The TV-5000 is yet another step forward in the art of monitoring," said Mr. Nakayama. "Users may be surprised at how much there is to see."





**Fig. 1. TrueTTY and AALog** — This shot shows the TrueTTY in action with the AALog entry screen in the lower right. A small portion of the log program is in the upper right. You see the spectral display at the top. The receiver passband is set at 400 Hz at this time. Even at 3 kHz the display window is not filled. Lots of room if you have a really wide open passband. The text panel just below is the receive screen. Below that is an active oscilloscope displaying the decoded signal. Two rows of macro buttons are displayed. Three are possible. (See text.) The four QSO info windows will gather info by double or single click (selectable) and that transfers directly to the entry screen. In this case, the callsign was grabbed from the receive panel, but the others were typed in as the reception was not that good. (Otherwise it would be all-caps in RTTY.) The horizontal line across the middle part of the spectral display is a guide of where the squelch is set compared to signal strength. You can adjust this to improve print. No guesswork here. The two programs work together without any flaw I detected. A package worth a look if you like RTTY with a little PSK31 thrown in and a great logging system.

## THE DIGITAL PORT

continued from page 47

software in order. As of this writing I have not registered the AALog so there are a few crippled functions, but there are plenty of features operating to allow me to import my current ADIF file and get the program to record contacts made with TrueTTY.

I was highly impressed as I saw how well the data was recorded in the new software. A large batch of data was imported at once and it was very good. Then a week or so later I decided to see how well an update would go from the same ADIF file, which had more QSOs added. The program popped up that there were some dupes but seemed to take that in stride and not insist on any action from me. The new QSOs were simply added, end of task, very neat and tidy.

Once all the data is in place, you can check Log Summary in the Tools pull-down and find a listing of most of the logging activities you might ever imagine a need for, as well as some you never thought about.

The only missing column I noticed in the program was one for U.S. counties. The counties listed in my ADIF file were not lost in space, they were simply relegated to the Notes file for the appropriate contact. If you are a county hunter this will not work for you. But that is the only real "flaw," if you can call it such, that I detected in AALog.

There is one other area not yet well addressed in this little suite of programs, and that is rig control, but Sergei is working on it. On the same Web site, you will find a small program called Hamport that is destined to talk to the modern rigs. I downloaded and installed it but found that my particular rig had been bypassed in the design. There are many others not listed in the Hamport setup and I am sure it is just a matter of time before this feature will be available as well.

Now that we had a working version of both the TrueTTY and AALog it was time to get it all laid out on the monitor and put it to work. There are a lot of excellent little features built into these programs. One is

the ease to bring up a log entry window. Simply hit the "Insert" on your keyboard, when AALog is active, and the information will start transferring from TrueTTY to the entry display.

You will have to make edits to the entry according to how picky you are about frequency listing and RST readings, but a number of obvious entries such as callsign and name are automatic and there is one that is not obvious. You can set that "Other" field to grab QTH info and that will go directly to the entry panel. The options for the Other field are selectable from the Setup menu.

Incidentally, speaking of entries, I noticed a lack of certain modes listed in AALog such as MFSK, HELL, and THROB to name a few. I found there is a file in the folder containing the program where you may add any mode you desire.

When you get to operating this software in RTTY you will discover a very high level of versatility. You can select Shift in all the popular widths from 23 Hz to 1000 Hz and baud rates from 45 to 1200. Plus, I realized the shift will adjust to fit slight variations, so the copy is about as good as RTTY gets.

What I found exceptionally useful is the ease of Xmit-Rcv offset. I happened on a DX station specifying receive frequency a little over 2 kHz above his calling or transmit frequency. This is very easily accomplished with TrueTTY. Left click places you on the receive frequency and right click sets your transmit frequency wherever you select.

This meant it was only necessary to check the offset frequency in the Status Line at the bottom of the display. A mental calculation showed I needed to separate the frequency readout in the two boxes by approximately 2000 and I would be in the ballpark. With the bandpass filter wide open at 3 kHz, I was able to alternately monitor the DX station and the little bumps 2 kHz up the band. No dials to change, just click and operate. Really slick.

The above incident made me aware that TrueTTY has space in the display for approximately a 5 kHz wide spectrum display. The average is usually 2.5 to 3 kHz and one other program displays 4 kHz. All this is of little value unless the rig has a passband width to match. I don't know of a rig that has, but it does stimulate the mind to possibilities.

I didn't mention the TrueTTY has AMTOR and Packet capabilities. AMTOR in FEC mode, not linked TOR mode. I only checked to see that it would transmit and did not attempt to find someone to make a contact with, but it would be interesting to work someone because Sergei has enhanced the AMTOR FEC as a selectable option.



Also, I checked the packet capabilities by monitoring a message board. It does receive well but does not have transmit capability. It is hard to imagine what the future holds for this program. The development goes on and the product to this point is well appointed and has enough differences that it is worth a look-see especially by those who enjoy a robust RTTY performer.

All in all, the TrueTTY-AALog experience is a fascinating one. After you work with the software for a while you begin to realize why some hams who are dedicated RTTY folk swear by this program. One little bit of forewarning. You will find the TrueTTY will download and install and jump through its hoops just fine without registering, but you will have to reconfigure it each time you boot the program until you register it. And I believe that includes the macros, so don't spend a lot of time perfecting the macros until you register your copy.

One other minor item, this does not appear to be a resource hungry piece of software. Check the requirements on the Web site. It appears it should run well on an early Pentium-based computer. That is always a good sign to me that the programmer has put forth the effort to write good code.

## Education

Every now and then I pay a small price for abusing the computer. I am careful not to allow grandkids to install games nor cruise the Internet, but I still find ways to mess the thing up on my own.

Recently, I purchased a set of reasonably priced speakers for this computer. The speaker history here has evolved around a mismatched pair of speakers that probably came from some AM radios older than my kids. These worked okay with a SB16 soundcard, but these new 64 series cards do not have enough drive to run them.

I have a few applications such as a dictionary that pronounces words and find it nice to have sound capability. The new speakers have a small amplifier in them and I do not know how they can produce these things at the price I paid.

The problem took about an hour to rear its ugly head. I had noticed the volume control for the soundcard output became ineffective, but all was going well as I checked the system with an E-mail from one of the major on-line suppliers that contained a promo including some music clips. Satisfied the speakers were well worth the investment, I turned my attention to the soundcard controls. Something did not seem correct — response was not normal.

I brought up a ham PSK program and could not reduce the ALC to zero. There are at least four displays with volume controls and these seemed, without any reason I could understand, to go to maximum setting about every other time I checked them. I could not get this thing under control and began to doubt my abilities (and sensibilities).

I will admit I stepped away from the computer and had dinner before tackling this problem, but it took the better part of an hour to add all the facts I just described and realize that some bugs, probably from the Internet sound source, had crept into the operating system and the eventual cure was to shut down and reboot the computer. The first reboot restored some sanity to the soundcard control but all things were not quite right until two more startups.

The lesson learned is it can happen to any of us. Don't even need teenagers around to help us out. Ah, well — education. I know there are hams who are happy as a clam who dedicate a computer to nothing but ham software in the shack. Maybe they are the truly educated.

## More SSTV

A few months ago, in the Sept. column, I wrote about using the SSTV-PAL editor with the MMSSTV communications package and between the time I wrote and the time you received your magazines, the Web site where you find the SSTV-PAL [<http://users.origin.net.au/~crac/>] contained a whole new group of downloads. Fortunately, since *The Chart* is easily accessible from here, I was able to put a note on the link to help guide you to the correct download.

This wasn't really a bad thing. What happened is there is now a new program developed by the author of SSTV-PAL termed SSTV-PAL+ (plus is all that is added) and what a plus it is. It is software for communicating with SSTV and includes the aforementioned editor as an all-in-one program. I downloaded the new software and was simply amazed.

It uses the MMSSTV engine which you have to install in the same folder and you are off and running. It is a beta version with a few kinks still to be dealt with at the time I tried it but workable and another clever approach by a creative programmer. You have to try it to see for yourself.

Speaking of the KB7NO Web site, I keep making little changes and additions. There is so much to tell that it feels like a project with no end in sight. I found a small item that makes the loading of the first page much faster. By reducing the pixels/inch (lower

quality?), the file is enough smaller that the load time with this dial-up modem is cut in half to about 7 seconds. Interestingly, the before and after displays on this monitor seem identical. Something to keep in mind when storing and transferring your images, especially via modem, is that a smaller file may be just as good as a file that is the better part of a megabyte.

## A little on Windows

I am forever giving the newer Microsoft platforms a bad rap, especially the Millennium Edition (Me) — well, that one deserves it. If you notice, quite a few ham programmers are avoiding the problems associated with making their programs run on Me. They simply do not bother to make their software run on Me.

However, there are quite a few excellent programs available to run on the XP operating system. I have avoided using it because not everything we have available will run on XP. But I see programmers extolling the virtues of the XP platform and they are writing some top notch software to run on that platform.

What I am getting at is the time is upon us when XP is standard fare on any computer we are apt to buy new. I recently had a few experiences with the XP and it does perform well with software that is written for it. The age-old problem of lock-ups and "blue screen" syndrome is as nearly licked as can be expected.

I saw a lock-up during a video session on a laptop that was visiting this house, and the system was truly locked tighter than a drum. The only cure was to switch off the power. I hate to do that due to the usual subsequent boot-up problems with earlier Windows systems after being shut down "improperly." This was a learning experience as I watched it power up, load

*Continued on page 57*

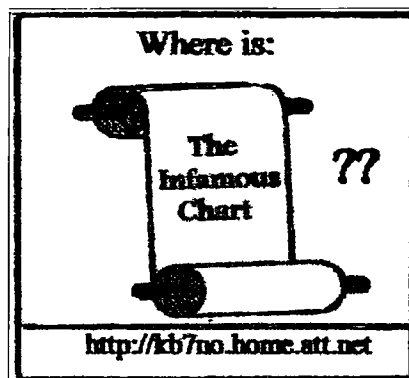


Fig. 2. Where The Chart is.



## ARDF World Championships Part 2 — Closer to the Gold

*"I felt like I was at an Olympic event!" That's how Dave D'Epagnier KØQE described his first trip to the World Championships of Amateur Radio Direction Finding (ARDF), from September 2-7, 2002, in the High Tatras of Slovakia. "It was a real eye opener to see how seriously the rest of the world takes this sport. The competition was very fierce and USA is indeed starting to gain respect."*

KØQE was one of the last to get back to the USA following the Eleventh ARDF World Championships (WCs), because he went on a two-week climbing trip to Italy right afterwards. Last month's "Homing In," the first of a two-part series on ARDF Team USA and the WCs, featured stories of the first of our daring dozen to return. Among them were Bob Frey WA6EZV and Dick Arnett WB4SUV, whose return trip didn't go exactly as planned.

"We left the mountains of Slovakia at 5 a.m. in a hurry to make our 12:50 flight from Budapest," Bob recalls. "We got to the Hungarian border at 11:10 and realized that we were barely going to make it. Finally we got to the airport and discovered that it was virtually empty. Air France was on strike. The good part was that the airline folks put us up in Budapest

overnight in a beautiful hotel, right on the river. They paid for our meals, bussed us over and back. Next morning we went out on a different carrier into Rome, then home from there."

I expected to get regular on-the-scene updates from Team USA via the Internet as I did during the Championships in China two years ago. But that was not to be. "There was only one Internet terminal," says WB4SUV, "and when you were on, there were ten people looking over your shoulder wondering when you'd be done." Because they had brought their own laptops, Bruce Paterson VK3TJN and Adam Scammell VK3YDF (Photo A) ended up being the official scribes of the events, sending regular detailed reports to their friends in the states and down under.

### Contouring and sinkholes

The three Australians joined six Team USA members at a special training camp in Hungary just before the WCs. The camp had a double purpose — to improve participants' skills in both radio direction finding and in-the-woods orienteering. "We did two days of fox-oring," WB4SUV reported. "It's a combination of ARDF and orienteering that teaches you to keep track of where you are on the map. You had to orienteer your way to the marked circles on the map. You couldn't hear the little fox transmitters until you were about 30 meters away."

Team member Gyuri Nagy KF6YKN hosted the camp in his native Hungary. Gyuri is a true ham, as his workshop attests (Photo B). Campers made use of his shop and tools, because some had to retune their



**Photo A.** The three-person team of Bryan Ackerly VK3YNG, Adam Scammell VK3YDF and Bruce Paterson VK3TJN trained with the USA team in Hungary. Each of them attended prior ARDF events in the USA. (All photos courtesy of Bob Frey WA6EZV)



**Photo B.** There's no doubt that training camp host Gyuri Nagy is a true ham. Here's the attic workbench where he built his fox transmitters.



2m ARDF receivers to lower European fox frequencies (**Photo C**). The 2m band is only 144-146 MHz in Europe.

At the camp, long-time orienteer Bob Cooley KF6VSE learned about signal propagation in canyons and ravines, which orienteers call re-entrants. "A two-meter signal bounces up and down a re-entrant," he says. "I've gotten so that I can recognize when I'm getting into that. And if you get into a stream bed, you might as well turn off your receiver to save the batteries. You're going to get total baloney for bearings on 2m, unless the fox is right there."

Marvin Johnston KE6HTS tells of a new technique he learned at camp, called contouring. "You don't want to go up or down hills more than you have to," he says, "so you run along the elevation contour lines on the map. It worked and I had a great time. I missed one contour and it cost me three or four minutes to get up and down the hill, but if I had followed the contour it would have been no problem."

"The training area had a lot of sinkholes," Marvin continued. "They were big pits where caves had collapsed. It was really interesting navigating around them." Bob Cooley added, "If a 2m transmitter was placed on the top edge of a sinkhole, I could get good bearings on it from a distance, but when I got within 100 meters, I had a hard time pointing my antenna directly to it."

This was USA's third trip to the World Championships. Team USA was up against more than 300 competitors from 28 other nations. The opening ceremony featured all of the teams standing at attention, watching performances by native dancers and other entertainers (**Photo D**).

As you read last month's description of the separate 2-meter and 80-meter

competitions, you probably wondered about our two best performers, Nadia Mayeva and Gyuri Nagy. Nadia took fourth in her age/gender category on 80 meters, but was 13th on 2m. Why? And what explains Gyuri's 19th place on 80 meters, when he had achieved fifth place on 2m two days before?

Nadia's two-meter problem began before she ever left the starting corridor. Typical maps at ARDF championships are pre-marked with start, finish, and out-of-bounds areas. But they weren't at these World Championships. WB4SUV recalls, "Of all the conversations we had at the Team Leaders meeting about the most minuscule details, the organizers never mentioned that we had to mark our own maps, and that there would be a master map in the starting area for that purpose. That threw me a curve."

"The master maps were clear down at the far table and I didn't even realize that I needed one. I was in a panic when I couldn't see start and finish on the map they handed me. I figured at first that it was there and I just couldn't locate it. I asked and they told me about the master map. I just had time to mark start and finish, not the other details from the master map. The Australians told me later that it's not unusual that maps have to be marked at championships."

Marking her own map was Nadia's downfall on two meters, as WA6FZV explains: "There was a swamp marked on the master map with a circle, and she thought that this was the finish. She didn't see the actual finish, the double circle on the top of the map. So she was navigating toward the wrong place to finish for a long time before she realized that everyone else was going in the opposite direction. Her equipment should have told her that she was headed for the

wrong place, but she wasn't listening to the homing beacon."

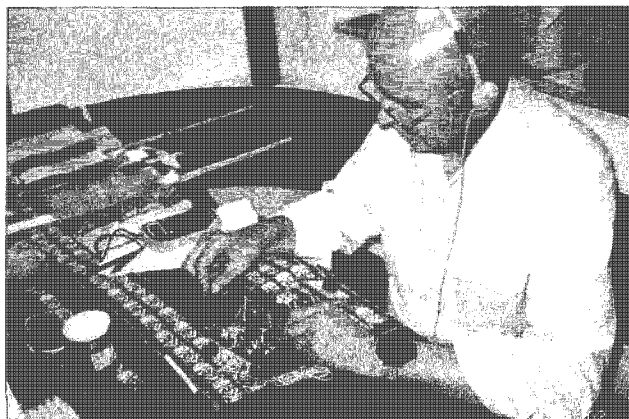
Gyuri's 80m problem was the result of too much activity. The physical stress of winning a medal in the Hungarian championships, then putting on a week of training courses, followed by the grueling WC two-meter hunt all took their toll. "He's having knee surgery soon," says WA6EZV. "That's why he slowed down on 80m. I passed him at one of the transmitters and I could see he wasn't running real strong. I think his knees caught up with him."

The 60-year-old knees of Bob Cooley also were problematic. "I was having trouble with my feet at the championships in China, so I was out of ARDF for a year and a half. I had an operation in April and just started running in June, so I'm not in as good a shape as I would like. I hope to get back there in another six months or so. I found that if you strengthen your quads a great deal, it sort of holds your knees together."

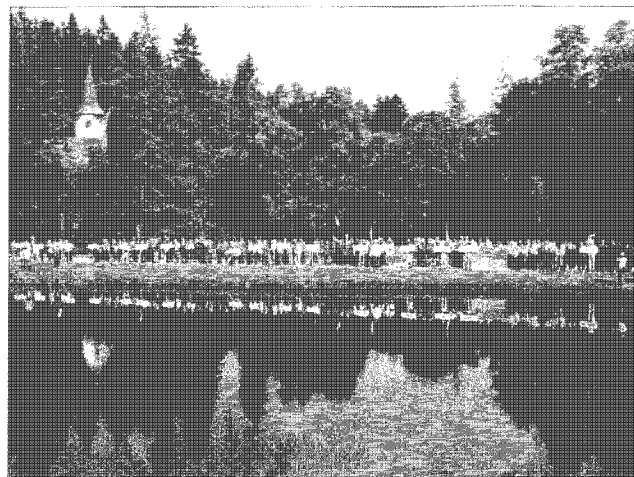
"I'm becoming allergic to wasp stings," Bob continued. "A year ago I received a bad sting and got hives all over my body. Now it usually gets worse each time. Just before the 2m start I got stung by a little bee. I thought, 'Well, it isn't a wasp and it didn't get me very bad.' Turns out it was OK, but I started out on the course wondering if I was going to drop dead in the first 30 minutes. There was total chaos in my mind and it took me an hour and five minutes to get the first transmitter."

### What ailed this fox?

One of the worst nightmares of an ARDF huntmaster is a malfunctioning fox transmitter. Unfortunately, it happened on the 80-meter championship day. An apparent

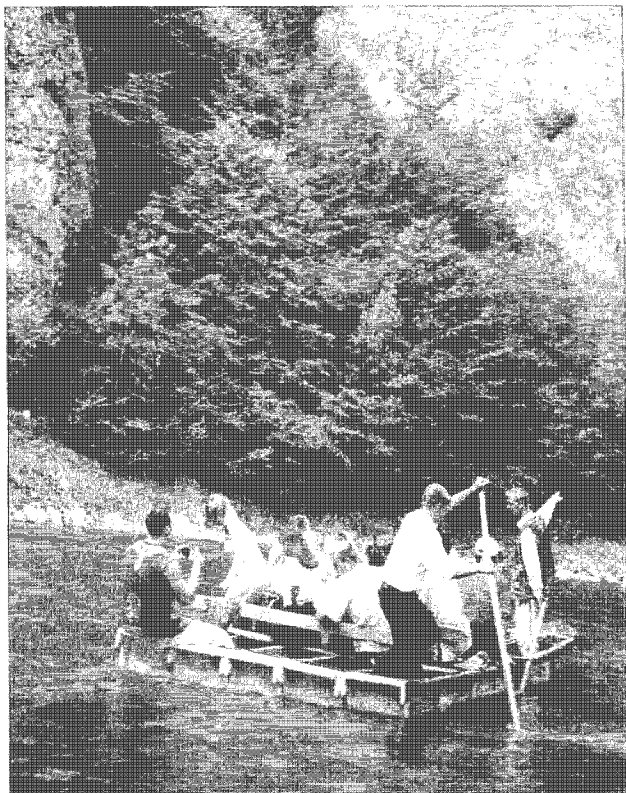


**Photo C.** Harley Leach KI7XF, a retired professor of engineering, helped retune some Australian receivers for the low operating frequency of European ARDF transmitters, and then fixed them when they stopped working.



**Photo D.** Opening ceremonies took place next to a scenic lake. By tradition, each team stood behind its national placard.





**Photo E.** On "Cultural Day" between the 2m and 80m competitions, the organized activity was a 7-mile rafting trip on the Dunajec River that borders Slovakia and Poland.



**Photo F.** Bob Frey WA6EZV tried poling a raft, which was made from six boats tied together.

antenna problem caused transmitter number four, which was closest to the starting line, to put out an extremely weak signal.

"It made me think it was far away, probably near the finish," WA6EZV reported, "So I dismissed it from my mind at first. I found fox #5 and expected to hear #4 stronger there, but nothing. I found out later that it was down in a valley and you had to be very close to hear it well. I ran within 150 meters of it and didn't realize it. Some other competitors had receivers that weren't sensitive enough to ever hear it." Bob Cooley added, "Enough people had gone to it that they decided they shouldn't fix it in the middle of the contest."

"I was so frustrated about it that I joined in with the Norwegians," says WB4SUV. "They drafted a letter of complaint and I signed it, even though I knew it wouldn't change the outcome. I went right past, probably within 50 meters on my way out. It was right off the trail from the starting corridor, but I thought it was on the other side of the earth because it was so weak. So I found all my others and got to the finish with 37 minutes to spare. Some other competitors, like Csaba Tisztartó of our team, did the whole course and then went back to get it last. That made the times higher than usual. It was an

extremely long course and that transmitter probably affected the times of everyone."

It's a tradition for the WCs to have a "cultural day" of rest between the 2m and 80m competitions. The organizers provide tours or other activities. "I went on the tour that they arranged," says WA6EZV (**Photos E and F**). "That turned out to be a great decision. We went rafting on the river, saw beautiful mountains, stopped and had lunch, then went shopping in Poprad."

Since they had a car available, some members of Team USA and Team Australia decided to make up their own tour. "They wanted to see a castle on a hilltop that they had heard about," Bob Frey says. According to VK3TJN, they parked the car and hiked up about a half mile toward the castle, only to find a locked gate. That didn't deter them, as one team member tried to raise the gate by slipping big rocks underneath it. Suddenly a woman came running toward them. Fortunately it was to let them in, because they had parked in the wrong place. It turns out that they could have driven to a parking lot right in front of the place.

"Nadia was with them and she had just a one-time-entry visa on her Russian passport," WA6EZV continued. "While going around the mountains, they decided to cross

over for a little while into Poland. That meant they had to leave her at the border. They couldn't loop around and come back another scenic way, because they had to return for her. Along the way, they wanted to find a scenic lake, but they couldn't find the road to that. It turned out to be a lot of driving and not much sightseeing."

Among the participating countries, there are wide variations in the level of competitors and training. Some national societies are big supporters of this aspect of amateur radio. Others aren't. "The Czech team appeared semi-professional," says WB4SUV. "They had a van with 'Czech Republic ARDF Radiosport Team' stenciled on the back. The Ukrainians are having an event and we got an invitation from their Team Physician who travels with them. By contrast, we don't all wear the same uniform, and sometimes not all the same colors."

#### **More to come in 2003 and beyond**

Bob Frey reports, "At the meeting of IARU ARDF Coordinators, I had a great time talking to all the leaders. I took the podium for about five minutes, giving greetings from you, from Region 2 Coordinator Dale Young WB6BYU, and from Canadian Coordinator



Joe Young VE7BFBK. We gave out cards and pins for next year's Region 2 Championships in Cincinnati. We have addresses for at least four countries that want formal invitations to attend."

Representatives from two ARDF clubs in the Czech Republic handed out invitations to the next ARDF WCs in Brno, from September 7-12, 2004. Brno is a city of half a million in the Moravian region of the country, about 135 miles southeast of Prague. Competitors will stay in dormitories of the Masaryk University, which becomes a hotel complex of over a thousand rooms in the summertime.

The Czech organizers are planning two new and innovative activities for attendees to their WCs. On the day of the opening ceremony, there will also be a "Masters Race" exhibition of world champions. It will be a 20-minute sprint with foxes on both bands, for medalists in the Senior male category only. On the traditional day off between the 2m and 80m competitions, the usual "cultural program" will be supplemented with a recreational event for non-racing team members, journalists, and other ARDF fans. Called "In the Masters' Footsteps," this event will take place in the same location as the previous day's 2m hunt.

After the Czech WCs, the next will be in Bulgaria during 2006, and then it's probably back to China in 2008. "We were formally asked if we wished to apply for the 2008 WCs," says WA6EZV. "We politely said no. We know we're still about a decade away from that, but it's nice to be asked."

There's no doubt that competition for the limited number of positions on ARDF Team USA for the 2004 WCs will be greater than ever, so now is the time to start honing your own RDF and orienteering skills. KØQE says, "I know I can do much better and I'm already making plans for a personal training program for the next WCs." KE6HTS reports, "Gyuri is willing to put on another training camp, in the USA this time. Tchernien Gouliev UA3BL from Russia is also interested in putting on a camp. He won silver medals on both 2m and 80m at this year's WCs."

An important qualifying event will be the next combined USA and IARU Region 2 ARDF Championships, taking place July 30 through August 3, 2003, near Cincinnati. If you missed the announcements in "Homing In" for August and September, see the "Homing In" Web site for more details and a link to the organizers' site.

Another opportunity to test your ARDF skills against experts from around the world will be the Fifth IARU Region 3 ARDF

Championships, November 20 to December 3, 2003, near Ballarat, Victoria, Australia. Visitors from countries outside Region 3 are welcome at the Australia events, just as visitors from around the world will be welcome at our 2003 championships in Cincinnati. Several radio-orienteers from USA are already planning a trip "Down Under" next year.

If it's too cold to have a practice radio-orienteering session in your home town this month, warm up the soldering iron and start planning for spring by building fox transmitters and RDF antennas for yourself and to loan to your local Scout troop. There are lots of equipment ideas at the "Homing In" Web site. Be sure to send photos and stories of the mobile and on-foot transmitter hunts in your hometown. E-mail and postal mail addresses are at the beginning of this article. 73

## Shedding Some Light on Dimmers

*continued from page 23*

Fig. 4 shows the circuit that can make the transformer look resistive. The value of the R and C can be calculated when the inductance and the reflected series resistance of the inductor are known:  $4L/R^2C = 1$ , where L is the inductance of the load and R is the sum of the resistance R in series with the capacitor and the resistance in series with the inductor.

It's probable that L won't be known, so make a stab at a capacitor and resistor, 0.22  $\mu$ F and a 100 ohm resistor are a good starting point. If the triac turns off, that's close enough. A capacitive diddle box (a capacitor substitution box) makes finding an acceptable value of capacitor easy — just increase the capacitance until the triac regains control.

You can find the R and C without the triac: Connect the inductive load with the R and C across an AC or DC source through a switch with visible contacts. Select an R that is equal to the resistance of the inductor and the minimum capacitor. As the switch is opened an arc will probably be seen. When an AC source is used, make several openings and closings to make sure you're not switching at the zero crossing of the voltage, then increase the capacitor until there is no arc.

Controlling the AC voltage to a universal wound motor makes a speed control. Also, a variable AC voltage can make a simple unregulated supply variable (of course, it will still be unregulated). Applying a variable voltage to the soldering iron will keep the temperature where you want it without burning the tip. A variable voltage to the coffee pot heater will keep your coffee at the right temperature, too. You could even use it to control the brightness of a lamp.

A word about controlling a power supply with a capacitor input filter: This kind of supply has an output voltage that is approximately equal to the peak of the rectified AC. Phase-controlled AC doesn't change the peak voltage until the conduction is delayed for more than 90°. When the power supply filter has either a choke input or a resistor input, the DC output approaches the average value of the rectified AC, and a dimmer does control the average.

Adding a resistor between the rectifiers and the filter capacitive reduces the supply's maximum output voltage by about 40%. The average voltage, the DC voltage, is  $0.636 \times E_{\text{peak}}$  or  $0.9 \times E_{\text{RMS}}$ . The resistor need not be large: A value in the order of 100 ohms when the capacitor is 100  $\mu$ F or larger will do the job.

When you need to vary the AC line voltage and a variable autotransformer isn't available, the light dimmer may save your bacon. The cost isn't great, and construction time won't interfere with watching the 10 o'clock news. The cost won't break the bank either; the parts are available from Radio Shack or Mouser Electronics (1-800-346-6873). 73

## Shack Switch for Foot Fetishists

*continued from page 27*

auto stores, like Strauss and Pep Boys, that still carry some of the nostalgia items from the '50s and '60s. At the Strauss auto store I saw the fuzzy dice, and right below was my Big Foot pedal.

I'm sure that you know that good



feeling. It's like finding something that you want at a flea market or garage sale at the right price. I went to the register and paid. I sometimes wonder what the young girl at the register or the guy in back of me thought this gray hair guy was going to do with his metal foot.

The rest is history. I went to the craft shop in town and found the base to mount it on. Craft shops are always a source of project material for me. If you have one in your town, add it to your list of places to visit. I guarantee that you will come away with some good ideas for ways to improve your shack.

My wood base cost me two dollars. The actual foot switch came from Radio Shack, part number 44-610. By itself, the foot switch is a little too small and too light. I mounted it to the base with some double-sided foam tape, and used an old hinge to mount my "Big Foot" to the wooden base. The foot was designed with two bars that went under and across the width of the gas pedal, so just substitute a thin piece of wood for the gas pedal and screw it to the base with a hinge from the hardware store.

It works really great! When I'm ready to transmit, I can be confident that when I put my real foot down, it will find the Big Foot switch! 73

## Ashore at Sacrifice Rock!

*continued from page 35*

Yes, indeed! Very soon, we decided.

### Notes

1. Report by VU2SBJ, Srikanth B. Bhat. Manipal. Photographs by VU2RDQ, Ro, and VU2SBJ, Sri. Band condition report (included in above) by VU3DMP, Chets.

2. This event was later supported partly by the Island Radio Expedition Foundation — IREF — to whom we are very grateful.

3. QSL cards received direct were being replied to directly immediately. (QSL card jpegs are available in attached files and also on our Web site.) All other nondirect cards sent via buro.

4. Our Web site is at [<http://www.vuiota.com>].

5. This expedition also activated the Kadalur Lighthouse, Amateur Radio Lighthouse no. IND-013. 73

## ABOVE & BEYOND

*continued from page 42*

this month. Hope you enjoyed the quick session on frequency counters and a short discussion of attributes of frequency counters and what's available in the surplus market that I have been able to look into. There are many other models available that are fine frequency counters also. It's just that I haven't had the opportunity to obtain them in surplus to gather personal experience.

Don't rush out and try to locate a specific counter for yourself. Wait a bit and try to see if it comes to you. In dealing with surplus junk dealers, you will find that they will push the price as high as the gleam in your eye will tolerate. Be devious! Pick up something else or show interest in other things, and maybe as a last resort, what is that price for this thing? This approach might catch you a bargain. It's your hard-earned cash and you want to get the best value possible. Don't drag your feet too slowly, as I missed a pair of Motorola HTs for 450 MHz being offered in working condition for \$35 each. I missed the deal by being 15 seconds too late on the trigger to say sold. But then you can't have everything. Go to swap meets prepared to act and investigate.

In that light, bring a small set of tools for swap meet exploration. A VOM to test batteries and power meter thermistor heads and a bunch of other things. Bring a small backpack to put your small test kit and other small goodies you find. To check out frequency meters in surplus dealer's premises, bring an HT — hopefully a multiband HT that will allow you to test on 2 meters, 450 MHz, and possibly 1296 MHz. Bring an extra rubber ducky antenna or use a clip lead or paper clip to get a sample of your HT into the frequency counter circuits and see if it works. Of course, first check to see if the internal calibrator is functioning. Just to be sure, you can power it up on AC. Bring both the old round HP power cords and one of the newer 3-prong blade construction. Check out the swap meet — there might be an AC outlet for testing in the snack bar or swap meet area. Most dealers don't have courtesy test AC cords hanging around, so

do a quick store test, and put some AC cords in your test back pack.

Well, that's it for this month. I hope everyone has a very Merry Christmas and a very Happy New Year. I will do my best to answer any questions you might have. Drop me an E-mail at [[clhough@pacbell.net](mailto:clhough@pacbell.net)] for a speedy reply. 73, Chuck WB6IGP. 73

## ON THE GO

*continued from page 43*

lighting conditions would be outstanding. When I say a real screen, I mean one that can display maps and such rather than abbreviated lines of text. With the price of LCD computer monitors coming down, this should be possible. Better yet, make it a touch screen so I could control the radio and the APRS message traffic more easily.

Then there's always the subject of DSP. I'd really like to have a good signal processor that can improve the quality of the signal I'm hearing. Ideally it would have the best features of both signal processing and frequency equalization as I get older and my hearing becomes less efficient. It would be great if I could process signals for digital modes such as PACTOR or SSTV through the same system. Add memories so I can easily change the settings from voice to data optimization and that would be extremely convenient.

Finally, here in Wyoming we have lots of sunshine and lots of wind. With two environmentally friendly and free-for-the-asking power sources, I sure would like to be able to tap into them. I'd be willing to buy a large, economy sized stocking just so you could leave me some solar panels and a small wind generator.

I don't want to put any pressure on you, or anything, but I'm hoping that you can take care of my Christmas list. If you do, it will give me material for my columns next year, too.

73, Merry Christmas, and Happy New Year,

Steve KE8YN/7

P.S. Don't worry about bringing socks, underwear, or neckties. The XYL will take care of those. 73

Say You Saw It In 73!



## HAMSATS

*continued from page 46*

in place, silicon grease applied to keep out moisture and allow the original end caps to easily slide back on, and the job was done.

The completed short dipole was then mounted between the 70-cm yagi and the 13-cm semi-dish/downconverter on the fiberglass boom. A subsequent SWR check after attaching a 60-foot length of RG-8X coax showed that the resonant point had not moved more than a few kHz.

### On the air

Much to my surprise, the first AO-7 pass after finishing the project was Mode A. Contacts from Canada to Mexico were easy. The telemetry beacon on 29.501 MHz was stronger on the new short dipole compared with the 80-meter inverted V, and the noise was lower than that heard on the attic-mounted 10-meter dipole. After a few weeks of operation, it was obvious that we had a winner. Although this simple short dipole was not the best for low horizon passes (I still want a beam), it did produce consistent results on most passes.

Whatever route you take with your Mode-A, AO-7 10-meter antenna, make it resonant near 29.450 MHz, mount it in the clear, and get ready for some excellent satellite communications. For more information about AO-7, check the specifications available on the Internet at [http://www.amsat.org].

## THE DIGITAL PORT

*continued from page 51*

Windows XP and go back to work just as if nothing had happened. Pretty cool.

Then I have a son with a slightly aged laptop who was fighting the Me syndrome. He has to run a lot of heavy-duty engineering applications and asked what I thought about upgrading to XP. Sounded good to me. Then I shuddered a bit after making such a blanket statement, and sat back and waited.

It worked so well we were both surprised. The XP is as near foolproof as one can expect and he has really put it through its paces. He describes software and data management that one would expect to cause a meltdown to the hardest of systems, and it just trucks right on through them with very minimal hiccups.

I have also heard of those who got too early into the XP and have had to download many fixes from Microsoft, but that may be behind us by now. I am not recommending

upgrading from Win98 to XP. Everything runs on 98, we know that. However, if you must purchase a new machine, you may not be able to run all your favorite programs, but I think there is sufficient software available to run on XP that you can make a go of it. My opinion? I stick with what I have working until it smokes. After that, I have to go with the flow. Most hams are a frugal lot and that includes this one.

That's about all there is room for this month. Take care and enjoy the digital stuff. See you there. Remember, *The Chart* is now on the Web at [http://kb7no.home.att.net], and you can E-mail me at [KB7NO@att.net]. 73, Jack KB7NO.

## NEVER SAY DIE

*continued from page 39*

administration, and the bureaucrats who do 99.9% of what little actual work is done, and who continue in power while Congress and administrations change. None of these groups can see any benefit to them in a better educated citizenry. They have a huge vested interest in the people being manipulated by the media, and being sheeplike.

Then there's big business. They need dumbed-down workers, not creative troublemakers. They're getting exactly the kind of workers they want from the present school system.

About the only constituency for better schools are the few parents who care one way or the other. Fortunately they're unorganized, so they're ignored.

School administrators oppose change. Teachers oppose change. The government opposes change. Business opposes change.

Is the situation hopeless? Of course not. But there's no point in marching around demonstrating for better schools or bitching about it. Total waste of time. So, what's the answer?

You don't win wars by attacking the stronger enemy head-on. You attack from an unexpected flank. This is why I've been writing about the need for replacing our schools with truly first-rate education delivered via DVDs. Technology can eventually make public schools irrelevant, just as cars obsoleted horses and bicycles.

The teacher unions keep hammering on the need to spend more money. Well, we have. Currently the tab is \$389 billion a year. That's with a "B." We've increased spending by 72% in the last ten years in constant dollars, yet SAT scores have been steadily dropping. The spending per student in constant

inflation-corrected dollars has gone from \$3,367 in 1970 to \$6,584 in 2000. The number of students per teacher has dropped from 22 to 17, and yet our kids are learning less and less.

The National Research Council found no improvement in student achievement resulting from greater funding or smaller classes. The U.S. Department of Education found last year that 68% of the fourth grade students could not read at a proficient level. Ditto math.

You can't blame the kids, not when there are some schools out there that are actually educating them. For instance? Like New York's Frederick Douglass Academy, where 79% of the students are black, 19% are Hispanic, and one percent is white or Asian. In 1998, 93% of their students passed the U.S. History Regents, and 88% passed the English and pre-calculus exams. 95% passed the Global History Regents, where citywide only 54% passed.

The Heritage Foundation recently published the Carter Report, which cited 21 High Performing Poverty Schools, so it can be done.

### More Smoke

Researchers at Osaka City University, using new ultrasound technology, were able to measure the effect of secondhand smoke on the cells that line the heart and blood vessels. They found that the blood flow in the hearts of nonsmokers was 20% better than that of smokers. However,

*Continued on page 62*

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# Read All About It!

*Part 13 of good stuff from The Hertzian Herald.*

## *All about Conductance Units; Dear ISP; Wired!*

Every ham knows that resistance is measured in ohms, and is calculated as the ratio of voltage to current:  $R = V / I$ . But there is no inherent reason why we speak of a component's ability to *resist* current; we might just as reasonably have chosen to speak of its ability to *conduct* current. Indeed, some engineering analyses, and some electronic instruments, do make use of conductance units.

The letter C being taken for capacitance, the quantity conductance is given the symbol G, and it is defined as the reciprocal of resistance:  $G = I / V$ . Until about 1965 the unit of conductance was the mho (ohm spelled backwards), and the unit symbol was an upside-down capital omega - the horseshoe-shaped letter. Then a fit of internationalism and political correctness overtook us, and the unit became the Siemens, in honor of Werner and William Siemens of Germany, who founded an electrical empire in Europe that exists to this day. (Note that the

small letter s denotes the time unit *seconds*. Capital S denotes the conductance unit *Siemens*.)

A 1-ohm resistor might just as well be called a 1-siemens conductor, and a 1-kilohm resistor is also a 1-millisiemens conductor. The three forms of Ohm's law, in conductance units become:  $G = I / V$  and  $I = GV$  and  $V = I / G$ .

Conductance in parallel add, so 1 mS in parallel with 1 mS yields 2 mS. In resistance terms, the equivalent statement is 1 k-ohm in parallel with 1 k-ohm yields 0.5 k-ohm. Putting this in equation form, for parallel elements:  $G(\text{tot}) = G(1) + G(2)$ .

Since G is the reciprocal of R, we can rewrite this in resistance terms:  $1 / R(\text{tot}) = 1 / R(1) + 1 / R(2)$ .

This is the familiar "reciprocal of the reciprocals" formula for parallel resistors.

Note that conductances in series do not add, they combine by a reciprocals formula of their own - but better to change them to resistances so they *do* add.

You may know that capacitors and inductors also oppose the flow of current — AC in this case — but they do it with reactance rather than resistance. Reactance does not produce heat as

resistance does. It limits current somewhat as a spring limits motion; it stores energy for a short time, then sends it back to the source. Reactance is given another quantity symbol, X, because it does not combine directly with resistance R. However, it is still a  $V / I$  ratio, with units of ohms. You are probably familiar with the equations for reactance of an inductor (L) and a capacitor (C):  $X(L) = 2 \pi f L$  and  $X(C) = 1 / (2 \pi f C)$ .

When a resistance and a reactance appear in series, they combine by the Pythagorean theorem to form a quantity called impedance, symbol Z. Taking  $R = 3$  ohms in series with  $X = 4$  ohms as an example:

$$Z = \text{SQRT}(X^2 + R^2)$$

$$Z = \text{SQRT}(3^2 + 4^2)$$

$$Z = \text{SQRT}(9 + 16) = 5 \text{ ohms}$$

All of this translates quite directly to conductance units. The reciprocal of reactance (symbol X) is susceptance (symbol B). The reciprocal of impedance (symbol Z) is admittance (symbol Y). When a resistance and a reactance appear in parallel, we convert them to a conductance (G) and a susceptance (B), combine them by Pythagoras to get a total admittance (Y), and take the reciprocal of Y to get the parallel

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impedance  $Z$ . As an example, let us combine  $R = 100$  ohms and  $X = 50$  ohms in parallel:

$$G = 1 / R = 1 / 100 = 10 \text{ mS}$$

$$B = 1 / X = 1 / 50 = 20 \text{ mS}$$

$$Y = \text{SQRT}(G^2 + B^2) = \text{SQRT}(10^2 + 20^2) = 22.4 \text{ mS}$$

$$Z = 1 / Y = 1 / 22.4 \text{ mS} = 44.7 \text{ ohms}$$

Reactances (or susceptances) cause phase shifts between AC voltages and currents, and a full discussion of this topic would deal with these also. But we've done enough for one session. Maybe next time.

### Dear ISP: The MTBF of your ISDN is SNAFU

Here is the FBI's list of wanted acronyms. Really common ones, like DOS and FM, have been omitted, as have really obscure ones, like ISAPI.

**ALC.** Automatic level control. A system for preventing overload and consequent distortion in SSB amplifiers.

**ALU.** Arithmetic Logic Unit. A main part of a computer's CPU.

**ASIC.** Application-Specific Integrated Circuit. An IC designed by an OEM for his specific purpose.

**ATE.** Automated Test Equipment.

**BIOS.** Basic Input Output System. A part of a computer's operating system.

**CAD, CAE, CAM.** Computer-Assisted Design, Drafting, Engineering, Manufacturing.

**CPU, MPU.** Central Processing Unit. Main Processing Unit, of a computer.

**CRC.** Cyclical Redundancy Check. An error detection and correction technique used in sending digital information.

**DARPA.** Defense Advanced Research Projects Agency.

**DAS, DAC.** Data Acquisition System. Data Acquisition and Control.

**DIN.** German Industrial Standard (Norm).

**EAROM.** Electrically Alterable Read Only Memory.

**EEPROM.** Electrically Erasable, Programmable Read Only Memory.

**EMI.** ElectroMagnetic Interference.

**ESD.** ElectroStatic Discharge, Damage.

**ESR.** Equivalent Series Resistance. A representation of the energy loss in a capacitor as though it occurred in a series resistor.

**FAT.** File Allocation Table. A portion

of a computer's disk memory containing the locations of all user files.

**FLOPS.** Floating point Operations per Second. A measure of a computer's processing speed.

**FSK.** Frequency Shift Keying. Sending digital data by shifting a carrier frequency between two set values.

**GUI.** Graphical User Interface.

**HVAC.** Heating, Ventilation, and Air Conditioning.

**ISDN.** Integrated Services Digital Network.

**ISP.** Internet Services Provider.

**ITU.** International Telecommunications Union. An agency of the UN.

**LSB.** Lower SideBand. Least Significant Bit. Least Significant Byte.

**MUF.** Maximum Usable Frequency. The highest frequency that will be reflected by the ionosphere.

**MIDI.** Musical Instruments Digital Interface.

**MIPS.** Million Instructions Per Second. A measure of computing speed.

**MOV.** Metal Oxide Varistor. A surge-voltage limiting device.

**MTBF.** Mean Time Between Failures.

**NC.** No Connection. Normally Closed. Numerical Control.

**NTSC.** National Television Systems Committee. The U.S. television standard since the 1940s.

**OCR.** Optical Character Recognition.

**OEM.** Original Equipment Manufacturer.

**PAL.** Phase Alternate Line. A TV standard used in some countries outside the USA.

**PLC.** Programmable Logic Controller.

**POP.** Post Office Protocol.

**POS.** Point of Sale.

**PPP.** Point to Point Protocol.

**PPM.** Parts Per Million. 1,000 ppm = 0.1%.

**PRF.** Pulse Repetition Frequency.

**PTO.** Permeability Tuned Oscillator. Tuning by means of a ferrite slug inserted in a coil, usually to achieve better linearity.

**RAM.** Random Access Memory. A memory that can be written to as fast as it can be read from. Random access (equally fast access to any data block) is no longer its defining feature.

**RTD.** Resistive Temperature Device. A component whose resistance changes with temperature.

**SCA.** Subsidiary Communications Authorization. Subscription music service sent as a subcarrier by an FM broadcast station.

**SCSI.** Small Computer Systems Interface. (Pronounced SCUZZ-ee.)

**SECAAM.** A television standard used in some countries outside the USA.

**SI.** System International. The metric system.

**SMD, SMT.** Surface Mount Device. Technology.

**TCP/IP.** Transfer Control Protocol/Internet Protocol.

**TDR.** Time Domain Reflectometry. A technique for locating cable faults by observing the time required for a pulse to reflect back from the fault.

**THD.** Total Harmonic Distortion.

**UART.** Universal Asynchronous Receiver-Transmitter.

**UPC.** Universal Product Code. The bar code.

**UPS.** Uninterruptible Power Supply.

**UTC.** Universal Coordinated Time. Greenwich Mean Time; Zulu.

**VAR.** Volt-Amps Reactive. The product of voltage times current, regardless of actual power.

**VXO.** Variable (frequency) Crystal Oscillator.

**WORM.** Write Once, Read Many.

### Wired!

It often strikes me as ironic that our technology of radio was originally called "wireless," because no component is more basic to its operation than wire. Indeed, my project bench is often a maze of wires. But, as with other components, choosing the right wire for a particular job requires an understanding of its characteristics.

Copper wire is commonly available in AWG (American Wire Gauge) sizes ranging from 0000, 000, 00, 0, 1, 2, ... up to gage 44. Size 0000 is 0.460 inches in diameter, and no. 44 has a diameter of 0.002 inch. In the middle range, no. 30 has  $d = 0.010$  inch.

Wire diameter decreases by a factor of 2 for every six size numbers; so no. 26 has half the diameter of no. 20. Resistance increases by a factor of 2 for

*Continued on page 61*



## December Forecast

*December historically offers some of the best propagation conditions of the year, but sharp skills, good equipment, and a bit of luck will again be required if you hope to do well this month. The sun continues to be highly unsettled with numerous moderate to strong flares expected, but we should have fewer bad days than in November. There are even a few Good (G) days to be found on the calendar this time, and positive seasonal influences will tend to work in our favor during all but the worst solar upheavals.*

The month will open with Poor (P) or possibly Very Poor (VP) conditions and I suspect that a Class-X flare or strong CME is likely. Though not shown on the calendar (because it is impossible to predict whether such events will be directed toward earth), we may experience occasional radio blackouts between the 3rd and 6th. The next major event is forecast for the 10th or 11th but the after effects should not be as severe. Another highly volatile day is plotted for the 16th but again, negative effects are expected to be short-lived. Beginning on Boxing Day (the day after Christmas) we should look for another period of moderate solar activity with an intense and potentially very disruptive burst coming on the 31st, perhaps lasting several days into the new year.

In between these times we can expect mostly Fair (F) conditions to prevail, which means that the more patient and experienced DX'ers can usually come up with some interesting contacts. The best intervals are centered on the 7th, 14th, and 21st and may include the 24 to 36 hours on either side of these days. Remember that the conditions shown on the calendar are expected averages for each 24-hour period, so good conditions can often be found at other times than the Good (G) days that are shown. Quite often the very best conditions follow right on the heels of the worst ones.

During the northern winter, auroral effects over the U.S. are more pronounced than at other times of the year, so operators living in the most southerly regions will fare the best. High power, careful tuning, and directional control can help those at high latitudes overcome the disadvantages of living near the auroral belt, but timing is the best antidote. Geomagnetic considerations aside, the auroral zone retreats the furthest northward at local noon, so mid-morning

EASTERN UNITED STATES TO:													
GMT	00	02	04	06	08	10	12	14	16	18	20	22	
Central America	15 (10)	20 (40)	20 (40)	(40)	(40)	(20-40)	(15) 20	10-20	10 (20)	10-17	10 (20)	(10) 20	
South America	(15) 20	20 (40)	20 (40)	20 (40)	x	x	(15-20)	x	(10)	10 (15)	10 (20)	(10) 20	
Western Europe	40	40	40	40	(40)	x	(10-20)	10 (20)	(10) 20	(15-20)	(20)	(20-40)	
Southern Europe	(20-40)	(40)	x	x	x	x	x	(10-12)	10 (17)	(12) 17	(15-20)	20	
Africa	(40)	(40)	x	x	(20)	x	(10-20)	(10) 20	(20)	x	x	x	
Eastern Europe	(40)	(40)	x	x	x	x	(10)	(10-15)	15 (20)	20	(20)	(20)	
Middle East	(40)	(40)	x	x	x	x	(10)	(10-15)	15 (20)	20	(20)	(20)	
India	x	x	x	x	x	x	x	(15-20)	x	x	x	(20)	
Pakistan	(15) 20	20	(20)	(20)	x	x	(20)	x	x	x	x	(10-20)	
Far East	(15-20)	x	x	x	x	x	x	(10-20)	(10-15)	x	x	x	
Japan	(10-17)	(15-20)	x	x	(20)	(30-40)	(20-40)	(10) 20	(10-20)	x	(20)	(10-15)	
Alaska	15-17	20-30	x	x	x	20-30	20-30	15-17	15-17	x	x	15-17	
Hawaii	(10) 15	(20)	20	(20)	20 (40)	40	(20-40)	(20)	(15-20)	x	(10)	10 (15)	
Western USA	(10) 40	(15) 40	20-40	(20) 40	40	40	40	(20-40)	(10-20)	10-20	10-20	10-20	

CENTRAL UNITED STATES TO:													
GMT	00	02	04	06	08	10	12	14	16	18	20	22	
Central America	(15) 20	20 (40)	(20) 40	(20) 40	(20) 40	40	(40)	(10) 20	10-15	10 (20)	15-20		
South America	(15) 20	20	20 (40)	20 (40)	(20)	x	x	x	(10)	10	10 (20)	(10) 20	
Western Europe	(40)	40	40	(40)	x	x	(20)	(15) 20	(10) 15	(15) 20	(20)	x	
Southern Europe	20	(20)	x	x	x	x	x	x	(10-15)	(10) 15	15 (20)	20	
Africa	x	(40)	x	x	x	x	x	(10) 20	(10-20)	x	x	x	
Eastern Europe	x	(40)	(20)	(20)	x	x	x	(10-15)	(10-15)	(20)	20	(20)	
Middle East	x	(40)	(20)	(20)	x	x	x	(10-15)	(10-15)	(20)	20	(20)	
India	x	(15)	x	x	x	x	(20)	x	(15)	x	x	x	
Pakistan	x	x	(20)	20	(20-40)	(40)	(20)	20	(15-20)	x	15	(15)	
Far East	x	x	x	x	(20)	(20)	20	(15-20)	(15)	x	(15)	x	
Japan	(10) 15	15	(15-20)	20	20 (40)	20-40	(20)	x	x	x	x	(10-15)	
Alaska	15-17	15-17	x	x	x	(40)	(40)	20	20	x	x	x	
Hawaii	(10) 15	(15-20)	20	20	(40)	(20-40)	20 (40)	x	(15)	(15)	(15)	(10) 15	

WESTERN UNITED STATES TO:													
GMT	00	02	04	06	08	10	12	14	16	18	20	22	
Central America	(20-40)	40	40	40	(40)	x	(20)	(10) 20	10 (20)	10 (20)	(10) 20	(15) 20	
South America	(17-40)	(20)	x	x	x	x	x	(15)	12 (20)	10-20	10-20	12 (40)	
Western Europe	x	x	(40)	(20)	(20)	x	(20)	(10-20)	(10) 20	(20)	x	x	
Southern Europe	(20)	x	x	x	x	x	x	x	(10)	(15)	15 (20)	(15) 20	
Africa	x	x	x	x	x	x	x	x	x	x	x	x	
Eastern Europe	(20)	(40)	(20)	20	20	(20)	x	(15)	(10) 15	(10-15)	(20)	(20)	
Middle East	(15-20)	x	x	x	x	x	(20)	x	x	x	x	x	
India	(10) 20	(15-20)	x	x	(40)	40	(40)	x	x	x	(10-20)	10-20	
Pakistan	(15)	(20)	x	x	x	x	x	(20)	(15) 20	(20)	(10-15)	10-15	
Far East	(10) 15	15	(15-20)	20	20 (40)	20-40	(20)	x	x	x	x	(10-15)	
Japan	(10) 15	15	(15-20)	20	20 (40)	20-40	(20)	x	x	x	x	(10-15)	
Alaska	15-17	15-17	x	x	x	(40)	(40)	20	20	x	x	x	
Hawaii	(10) 15	(15-20)	20	20	(40)	(20-40)	20 (40)	x	(15)	(15)	(15)	(10) 15	
Western USA	(10) 40	(15) 40	20-40	(20) 40	40	40	(20-40)	(10-20)	10-20	10-20	10-20	10-20	

December 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
1 P	2 P	3 F-P	4 F-P	5 F	6 F	7 F-G
8 F	9 F	10 F-P	11 P	12 F	13 F-G	14 G
15 F	16 P	17 F	18 P	19 F	20 F	21 G
22 F-G	23 F	24 F	25 F	26 F-P	27 P	28 P
29 F	30 G	31 P				



through mid-afternoon are usually the best hours to be on the air. You can view the size and location of the auroral oval online at a number of Web sites including [http://www.space.com/spacewatch/aurora\_cam.html].

That's all until next time. Happy Holidays and good luck! Jim Gray [akdhc2pilot@yahoo.com].

## Band-By-Band Forecast

### 10-12 meters

Worldwide opportunities can be found from sunrise to sunset, but daylight lasts only 8-9 hours for most of the U.S. so openings will be narrow. Southern Europe, the Middle East and Africa will be your best bets from sunrise through late morning. Central and South America will dominate these bands from mid morning through late afternoon, but the South Pacific and Asia will begin to pick up around noon and should be fairly strong around sunset and a little bit into the evening. The morning and evening gray-line paths will provide short-lived but very strong propagation conditions, although your geographic choices will be limited. Daytime short-skip will range from 1,000 to approximately 2,000 miles.

### 15-17 meters

Worldwide openings will occur from sunrise to mid-evening. Paths to the equatorial regions and the southern hemisphere will be favored, although a few northerly locations will be accessible. Europe might be workable before noon but that path is often blocked by auroral activity, so North Africa and the Middle East is a better bet. Most stations near or below the equator won't come alive until after lunchtime, but central Africa may become readable shortly before noon. As usual, Latin American traffic will dominate these bands most of the afternoon but Asia and the South Pacific should begin to compete around supper time. Short-skip will average from 1,000 to 2,200 miles.

### 20 Meters

Good DXing should be available around the clock but solar activity will tend to diminish openings. Look for peaks just after sunrise, during the late afternoon, and again in the early evening. Try Australia up to mid-morning, Europe from mid-morning through early afternoon, and Africa in the late afternoon. Central and South America should be open most times except around sunrise. Asia and the Orient will only be

available to night owls. Early risers might try long paths across the Antarctic into southern Asia and the Near East. Short-skip can range from 500 miles during the day up to 2,100 miles at night.

### 30-40 meters

Good worldwide opportunities can be found from about 7 p.m. to 7 a.m. local time. Central and South America will be the dominant stations, but operators east of the Rockies may find Europe and the Middle East just as strong between supper time and midnight. Hams living in the western U.S. will probably only find strong signals in the direction of Central America although the Middle East may open up for a few hours in mid-evening. Japan and Australia will be limited to late night hours for West Coasters. Skip distance is between 750 and 2,000 miles at night but but less than 1,000 miles during the day.

### 80-160 meters

Some decent worldwide DXing will be available from sunset through sunrise, but high sunspot activity will again weaken signals. Easterners should find the best openings to Europe or North Africa from just after sunset to midnight. Midwestern operators will find the Caribbean and the Americas strong all night, while stations west of the Rockies will find weaker openings both there and in the South Pacific or Far East. Expect skip to be between 1,000 and 2,000 miles at night.

## Read All About It!

*continued from page 59*

every three gage numbers. For example, no. 13 copper wire has 2.0 ohms per 1000 ft., and no. 16 has 4.0 ohms per 1000 ft. Another way of saying this is that resistance is cube-root-of-two or 1.26 times higher for each number increase in gage.

One of the most practical questions about wire is, "What size wire do I need to carry a particular current?" For wires in bundles or in confined areas, and a temperature rise of 10 degrees C (18 F), the following table may be used:

No. 28 (wire-wrap)	3/4 A
No. 22 (hookup wire)	2 A
No. 18 (lamp cord)	5 A
No. 12 (house wire)	10 A

For a single wire in free air, or if temperature rises up to 35 degrees C (63 F) are permissible, these allowable currents may be increased by a factor of two.

Stranded wire is sized to have approximately the same resistance as equivalent-sized solid wire. For example, no. 18 stranded may consist of 16 strands of no. 30, or 65 strands of no. 36 wire. The advantage of stranded wire is that it flexes more easily, and resists breaking under continuous flexing.

At high frequencies, magnetic fields within the wire force nearly all of the current to flow at the surface of the wire, leaving the inner core relatively useless. This is called "skin effect." Copper-clad steel antenna wire conducts quite as well as solid copper, because all the RF current flows in the skin anyway. Plastic TV antenna elements with a thin aluminum coating are as effective as solid aluminum elements for the same reason.

At audio frequencies single-wire conductors (such as antennas, coax cables, and power lines) experience skin-effect problems for wire sizes larger than about no. 10. When wound in coils, wire sizes larger than no. 22 are seriously affected.

At a frequency of 100 kHz, single wires larger than no. 22, and coils of wire larger than no. 42 suffer increased resistance from skin effect. Above 1 MHz, virtually all wire sizes are seriously affected.

To give you a practical example of what this means, a single-layer 100-turn coil of no. 32 wire on a 1/2-inch diameter form will have a DC resistance of 4.2 ohms, an inductance of about 50  $\mu$ H, and a reactance of about 640 ohms at 2 MHz. The Q might be expected to be 640 / 4.2 or 150, but skin effect will raise the AC resistance to about 42 ohms, and the Q will actually be about 15.

Stranded wire suffers from skin effect as much as solid wire. However, back in the 1920s radio coils were often wound of separately insulated strands soldered together at the ends. This "litz" wire gave some relief from skin-effect resistance and resulted in sharper tuned circuits.



## NEVER SAY DIE

continued from page 57

just 30 minutes of breathing secondhand smoke brought their blood flow down to that of the smokers. That's something for smokers to think about when they light up in the car with their kids in the back seat.

### Still Another Poison

Since acrylamide is well known to cause cancer in lab animals, and the EPA allows no more than 0.12 micrograms in an 8-oz. glass of water, what are some other common sources? The Swedish government ran some tests on some items which might be of interest.

In micrograms per serving they reported that Tostitos tortilla chips had 5, Honey Nut Cheerios 6, Cheerios 7, Lay's potato chips 8, Fritos corn chips 11, Pringles 25, Wendy's french fries 39 (big: 530 calories), KFC potato wedges 52, Burger King french fries 59 (large: 600 calories), and the winner by a mile: McDonald's french fries 82 (large: 610 calories). No wonder kids are getting cancer at such early ages, as well as fat.

### West Nile Hype

Ya wanna have some fun? Try and get any honest data on West Nile virus victims from the CDC or state authorities. Investigative journalists have and failed.

You may remember that New York attributed seven deaths to WNV, but you won't get any details. Independent research found that all seven were over 75 years old, one had a serious heart condition, two had cancer with heavy chemotherapy (no immune system left), and all had poor immune systems. None of the deaths were actually attributed to WNV.

We're told that children and the elderly are at risk. Baloney. Children are far more at risk from pesticides and mosquito repellents.

So what's different about WNV? Not much. In its effect on humans it is just like St. Louis virus, which has been around since 1933. Less than 1% of people infected with WNV or SLV develop any serious illness.

### Pottenger's Cats

Back in the '40s, Francis Pottenger, a dentist, decided to see what effect diet might have on longevity. He picked cats for his research. 800 of 'em. He split them into two groups. He fed one group raw food. This group remained healthy throughout the experiment. The other group he fed processed food. Junk food.

The first generation of the second

group developed arthritis, diabetes, allergies, and cancers, just like we humans do. They developed these diseases toward the end of their life span, which was about two-thirds as long as the raw food eaters.

The second generation junk food eaters developed these same diseases toward the middle of their lives.

The third generation developed them early in their lives. There was no fourth generation, since the third-generation cats were unable to conceive, or when they did, they aborted.

It was Pottenger's research that helped convince Dr. Bruno Comby to put his sicker patients on all-raw-food diets. The results were spectacular, as reported in his book, *Maximize Immunity* (see page 8 of my *Secret Guide to Wisdom*).

Today, in America, 25% of our young adults are unable to conceive. Spontaneous abortion and miscarriages are on the rise. The number one killer of children under ten today is cancer!

Well, look at how our diet has changed in the last hundred years, about four generations ago. That was before supermarkets and fast food. We ate fresh food, raw milk, and meat with no growth hormones or antibiotics. That was before packaged and frozen food. That was when people were eating around five pounds of sugar a year instead of 150. That was before our farmlands were depleted of minerals. That was before crops were sprayed with pesticides. That was also before deodorants, bug sprays, toothpaste with fluoride, and so on. Our kids are coming down with diseases which used to only strike the elderly.

Pottenger found that he could reverse the problem by changing the cat's diet to raw food, but it took three generations to do it.

It's something for parents who are feeding their children sugar-frosted cereal, swimming in a bowl of growth hormone- and antibiotic-laced pasteurized milk, for breakfast to think about. Oh, and Pop-Tarts.

### American Imperialism

With the collapse of the USSR, which we bankrupted with our military spending, the U.S. is the world's only superpower. We're not sure just what this means or how we should act, but we do seem to feel a growing collective responsibility for managing the world. Like our excursions into Haiti, Somalia, Kosovo, the Gulf War, and so on. Oh, we try to wrap ourselves in the cloak of the U.N., but it's a thin disguise.

We are, by far, the mightiest military power in the world. Today we spend more on our military than the militaries

of the next fifteen largest countries combined. That's major mighty. Our economy is larger than those of Germany, Japan and Great Britain combined.

### Box Cutters

Have you seen anything in the media about how all of those 911 hijackers managed to get box cutters through the airline security systems? I haven't heard anything about anyone being stopped with a box cutter. There was a suggestion at the time about the possibility that they might have been hidden in the seats by conspirators in the ground crews.

What I haven't seen mentioned anywhere in the news was a report I got from a good friend who is a flight attendant for Delta.

One of the first moves by Delta after the attack was to have the seats of all Delta planes checked for any possible weapons hidden in them. My informant says that box cutters were found hidden in the seats of 23 of their planes. Wouldn't you expect that this would be a screaming headline in the newspapers?

Which raises the question ... how much else are we not being told.

Conspiracy buffs are having a ball with the WTC attack.

When you read *Into The Buzzsaw*, which documents one huge government cover-up after another, and *Day of Deceit*, which documents President Roosevelt's planning and arranging the Pearl Harbor attack, we begin to suspect that conspiracies may be more the rule than the exception, and that our hope that the media will blow the whistle is a fantasy.

It could be that the fast airline action in removing box cutters from who knows how many planes may explain the lack of the second expected attack. If one airline found 23 planes with box cutters in the seats, how many were found by other airlines? And how about the coordination it took to get so many of them hidden in the planes by ground crew terrorists? I don't recall anything ever being in the media about these members of the terrorist group being hunted or caught. 73

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# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

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**The Blood Purifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! \$10 (#01)

**Plant Growth Stimulator:** This has the same circuit as the above, all ready to use. Many customers are buying second and third units for their family. Postpaid: \$155 (#PGS).

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat.

What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

**Travel Diaries:** You can travel amazingly inexpensively - once you know the ropes. Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under \$1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. \$5 (#11)

**Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

**Wayne's Caribbean Adventures:** My super budget travel stories - where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out is right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UL, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

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**Colloid Reprint.** April '97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Clips.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99).

**AC-powered Colloid Kit:** 12V power supply, silver wires, reprint, including priority mail shipment. \$37 (#82)

**Four Small Booklets Combo:** \$3 (#86). Super Organic Food: a trillion dollar new industry; Schools in 2020: another \$ trillion industry. Anthrax, a simple cure. Dowsing: why and how it works.

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**Stuff I didn't write, but you need:** *NASA Mooned America:* René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

**Last Skeptic of Science:** This is René's book where he debunks a bunch of accepted scientific beliefs - such as the ice ages, the Earth being a magnet, the Moon causing the tides, and etc. \$30 (#91)

**Dark Moon:** 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$25 (#92)

**1982 General Class License Study Guides.** Teaches the fundamentals of radio & electricity. Was \$7. I found a few in the warehouse. \$3, while they last. Great book! (#83)

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